A Health Equity Approach to Obesity Efforts: A Workshop

Background Resources

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The Social Determinants of Health: Coming of Age

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Annu. Rev. Public Health 2011. 32:381–98

First published online as a Review in Advance on November 22, 2010

The *Annual Review of Public Health* is online at publhealth.annualreviews.org

This article's doi: 10.1146/annurev-publhealth-031210-101218

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0163-7525/11/0421-0381$20.00

Keywords

social factors, socioeconomic, social position, social patterning of health

Abstract

In the United States, awareness is increasing that medical care alone cannot adequately improve health overall or reduce health disparities without also addressing where and how people live. A critical mass of relevant knowledge has accumulated, documenting associations, exploring pathways and biological mechanisms, and providing a previously unavailable scientific foundation for appreciating the role of social factors in health. We review current knowledge about health effects of social (including economic) factors, knowledge gaps, and research priorities, focusing on upstream social determinants—including economic resources, education, and racial discrimination—that fundamentally shape the downstream determinants, such as behaviors, targeted by most interventions. Research priorities include measuring social factors better, monitoring social factors and health relative to policies, examining health effects of social factors across lifetimes and generations, incrementally elucidating pathways through knowledge linkage, testing multidimensional interventions, and addressing political will as a key barrier to translating knowledge into action.

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INTRODUCTION

Growing Attention in the United States to the Social Determinants of Health

Social determinants of health (SDOH): social (including economic) factors with important direct or indirect effects on health

World Health Organization (WHO) Commission: Commission on the Social Determinants of Health

Robert Wood Johnson Foundation (RWJF) Commission: Commission to Build a Healthier America

Social advantage or disadvantage: refers to the relatively favorable or unfavorable social, economic, or political conditions that some groups systematically experience based on their relative position in social hierarchies

The impact of absolute material deprivation—grossly inadequate food, clothing, shelter, water, and sanitation—on health has been recognized for centuries (93); until relatively recently, discussions of socioeconomic influences on health in the United States focused primarily on links between poverty and health. Over the past 15–20 years, however, a new discourse on social factors and health—with wider relevance to the general population—has emerged in the United States, building on earlier work in Europe and Canada. **Figure 1** illustrates the rapidly growing literature on the social (including economic) determinants of health (SDOH) in the United States and elsewhere. The concept is becoming far less marginal in the U.S. public health realm in general, not only in academia; the SDOH have received increasing attention from public health and nonprofit agencies (21, 29, 88, 90, 113).

This growing momentum reflects a confluence of several phenomena: First, an accumulating critical mass of knowledge in social and biomedical sciences from the United States and other countries (1, 10, 123) has led to increased understanding of how social factors influence health and has enhanced the scientific credibility of relevant efforts. Notable recent initiatives include the World Health Organization (WHO) Commission on the Social Determinants of Health (122), the MacArthur Foundation Network on Socioeconomic Status and Health (111), and the Robert Wood Johnson Foundation (RWJF) Commission to Build a Healthier America (91). Incremental improvements in health with increasing social advantage have now been observed in the United States (14) as well as in Europe (69, 92), indicating the relevance of SDOH for middle-class as well as the most disadvantaged Americans. Systematic efforts have disseminated this knowledge and made it compelling for broader U.S. audiences (17, 91).

An increasing focus among U.S. researchers, health agencies, and advocates on the concept of health equity has also contributed, encompassing the spectrum of causes—including social determinants—of racial/ethnic and other social disparities in health that raise concerns about justice (8, 15, 79, 88, 113). Finally, U.S. public health leaders and researchers have increasingly recognized that the dramatic health problems we face

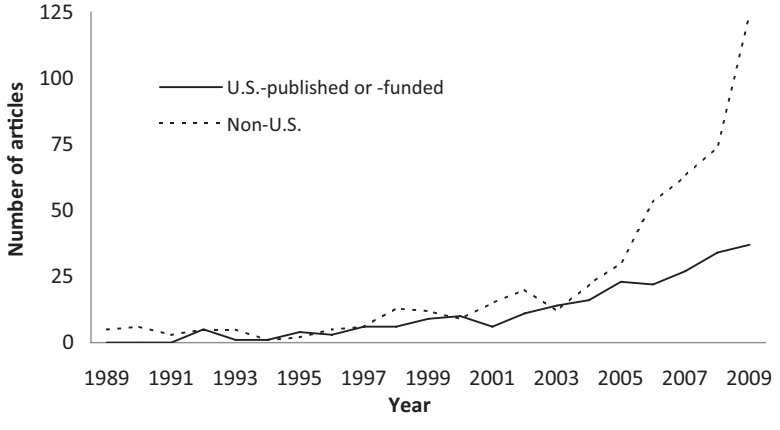


Figure 1

Increasing number of studies of social determinants of health in the United States and Europe. Source: Results of a PubMed search for "social determinants." Literature related to health outcomes, indicators, or promotion was included; health-care literature was not included.

cannot be successfully addressed by medical care alone. The low U.S. ranking on key health indicators internationally has continued to fall as our medical expenditures skyrocket, far outstripping those of healthier nations.

Upstream and Downstream Social Determinants of Health

The term social determinant of health is often used to refer broadly to any nonmedical factors influencing health, including health-related knowledge, attitudes, beliefs, or behaviors (such as smoking). These factors, however, represent only the most downstream determinants in the causal pathways influencing health; they are shaped by more upstream determinants. To illustrate the upstream/downstream metaphor, consider people living near a river who become ill from drinking water contaminated by toxic chemicals originating from a factory located upstream. Although drinking the contaminated water is the most proximate or downstream cause of illness, the more fundamental (yet potentially less evident, given its temporal and physical distance from those affected) cause is the upstream dumping of chemicals. A downstream remedy might recommend that individuals buy filters to treat the contaminated water before drinking; because more affluent individuals could better afford the filters or bottled water, socioeconomic disparities in illness would be expected. The upstream solution, focused on the source of contamination, would end the factory's dumping. Although these concepts may make intuitive sense, the causal pathways linking upstream determinants with downstream determinants, and ultimately with health, are typically long and complex, often involving multiple intervening and potentially interacting factors along the way. This complexity generally makes it easier to study—and address—downstream determinants, at the risk of failing to address fundamental causes.

Downstream social determinants: factors that are temporally and spatially close to health effects (and hence relatively apparent), but are influenced by upstream factors

Upstream social determinants: fundamental causes that set in motion causal pathways leading to (often temporally and spatially distant) health effects through downstream factors

This article focuses on the more upstream social determinants of health—the factors that play a more fundamental causal role and represent the most important opportunities for improving health and reducing health disparities. **Figure 2** illustrates the conceptual framework for the RWJF Commission's work. Although the relationships are more complex, this simplified schema highlights several important concepts. First, it shows that health-related behaviors and receipt of recommended medical care (key downstream determinants of an individual's health) do not occur in a vacuum. Rather, these factors are shaped by more upstream determinants related to the living and working conditions that can influence health both directly (e.g., through toxic exposures or stressful experiences) and indirectly (by shaping



Figure 2

What influences health? Upstream and downstream determinants.

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the health-related choices that individuals have and make for themselves and their families). The diagram highlights how health is shaped not only by living and working conditions, but also by even more upstream determinants that reflect the economic and social resources and opportunities that influence an individual's access to health-promoting living and working conditions and to healthy choices.

Educational attainment (often referred to simply as "education"): years or level of completed schooling, which does not reflect the quality of education

WHAT DO WE KNOW ABOUT THE ROLE OF SOCIAL FACTORS IN INFLUENCING HEALTH?

The Patterns of Association between Social Factors and Health

Evidence from decades of research examining associations between key social factors—primarily educational attainment and income in the United States and occupational grade (ranking) in Europe—and health outcomes throughout the life course overwhelmingly links greater social disadvantage with poorer health (1, 10, 27, 46, 66, 67). The striking and pervasive—albeit not universal—patterns are informative. Researchers have observed stepwise socioeconomic gradients in Europe, particularly the United Kingdom, for 30 years (69, 92) and more recently in the United States (14, 73, 82). As seen in **Figure 3**, using U.S. data, overall and in multiple racial/ethnic groups, the improvements in health with increasing social advantage—measured here by income—generally follow a stepwise, incremental gradient pattern: Although the most disadvantaged—those with below-poverty-level incomes or without high-school completion—typically experience the worst health, even those with intermediate income or education levels appear less healthy than the most affluent/educated (14).

The social gradients in health provide clues to understanding the SDOH. Although other research is needed to clarify the underlying pathways, the dose-response relationship suggested by the gradient patterns supports the biological plausibility of a fundamental causal role for one or more upstream SDOH. Gradients by income, education, or occupational grade could reflect relatively direct health benefits of having more economic resources (e.g., healthier nutrition, housing, or neighborhood conditions, or less stress due to more resources to cope with daily challenges), unmeasured socioeconomic factors, and/or associated psychosocial/behavioral factors, such as health-related behaviors (109), self-perceived social status (121), or perceived control (68). Reverse causation as an alternative explanation is discussed below.

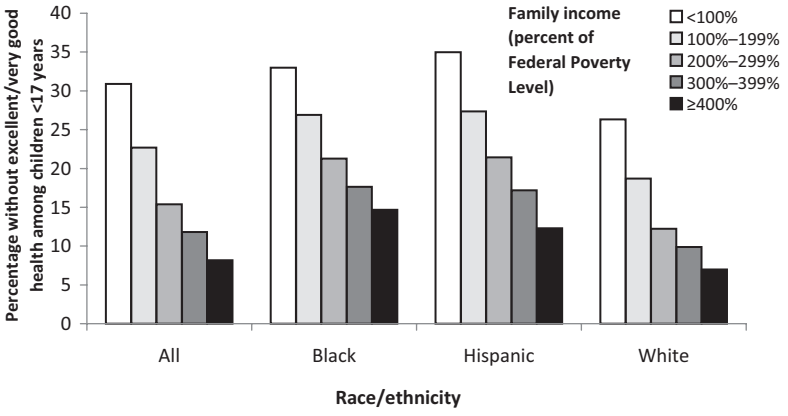


Figure 3

Social gradients in self-reported health overall and within racial/ethnic groups. Source: National Health Interview Survey 2001–2005.

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Understanding the Pathways through which Social Factors Shape Health

Following the framework depicted in **Figure 2**, we briefly review current knowledge of how several important upstream social factors influence health.

Neighborhood conditions and health. Neighborhoods can influence health through their physical characteristics, such as air and water quality and proximity to facilities that produce or store hazardous substances; exposures to lead paint, mold, dust, or pest infestation in housing; access to nutritious foods and safe places to exercise; or risk of pedestrian accidents (6, 23, 48, 49, 51, 77, 97). The availability and quality of neighborhood services—including schools, transportation, medical care, and employment resources—can also influence health, e.g., by shaping residents' opportunities to earn a living (43, 83, 117). Neighborhoods' physical and service characteristics can create and reinforce socioeconomic and racial/ethnic disparities in health. Health is also shaped by social relationships. For example, neighborhoods where residents express mutual trust and are willing to intervene for the public good have been linked with lower homicide rates (76, 98); conversely, less closely knit neighborhoods and more social disorder have been related to anxiety and depression (32, 84, 94).

Many—but not all—studies have found that neighborhood features are associated with health even after considering residents' individual-level characteristics (37). Surprisingly, some researchers—albeit not many—have found poorer health among disadvantaged individuals living in relatively advantaged neighborhoods (85, 89, 120), possibly because of adverse psychological effects of feeling worse off than one's neighbors and/or stronger social ties or reduced exposure to discrimination associated with a greater geographic concentration of one's own group (119).

Working conditions and health. The physical aspects of work—the traditional domain of occupational health and safety—represent an obvious pathway through which work influences health. For example, jobs requiring repetitive movements and/or high physical workload put workers at higher risk for musculoskeletal injuries and disorders (81), whereas physically inactive workers in sedentary jobs are at increased risk of obesity and chronic diseases such as diabetes and heart disease (115); physical conditions in the workplace such as inadequate ventilation, high noise levels, and hazardous chemical exposures can also harm health. Psychosocial aspects of work represent another pathway to health. For example, working overtime has been associated with injury, illness, and mortality (20). Workers in jobs characterized by high demands coupled with low control or by perceived imbalance of efforts and rewards are at higher risk of poor health (34, 56); control at work may be a major contributor to socioeconomic differences in health among employed persons (56, 68). Social support at work has also been linked with health (104–107); environments facilitating mutual support among coworkers may buffer against physical and mental health stressors (60).

Work-related opportunities and resources can also influence health. Employment-related earnings represent most Americans' primary economic resource, shaping health-related decisions made for themselves and their families; work-related benefits—including medical insurance, paid leave, schedule flexibility, workplace wellness programs, child- and elder-care resources and retirement benefits—could also be important. Well-paying jobs are more likely to provide benefits, greater financial security, and ability to afford healthier living conditions. In contrast, the working poor—estimated at 7.4 million U.S. workers in 2006 (112)—generally do not earn enough to cover basic necessities and are less likely to have health-related benefits (27, 54). Different pathways linking work and health may interact to exacerbate social disparities in health: Socially disadvantaged groups

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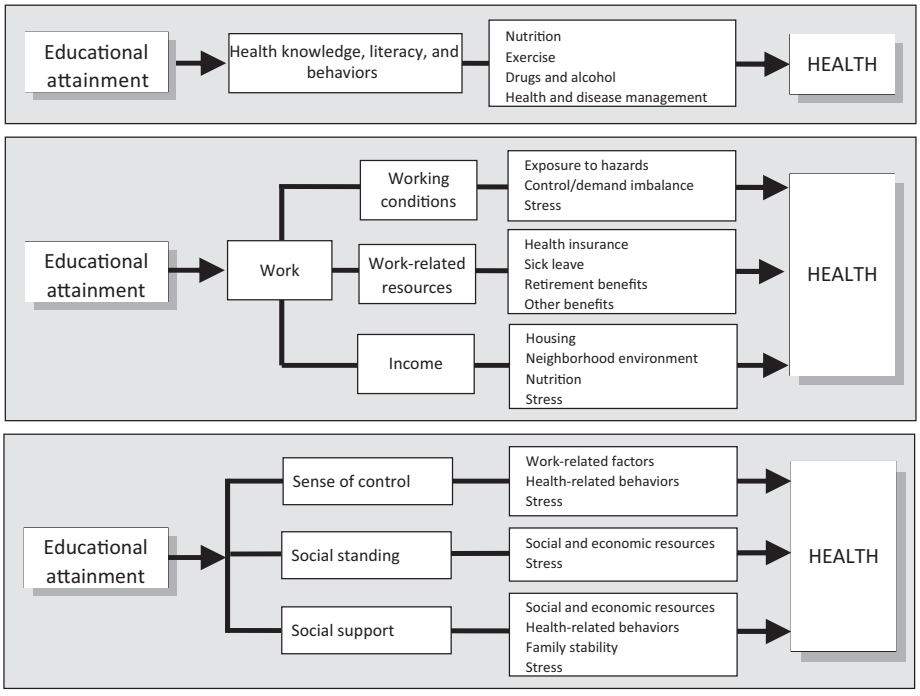


Figure 4

Multiple pathways linking education to health.

are more likely to have health-harming physical and psychosocial working conditions, along with disadvantaged living conditions associated with lower pay (38).

Education and health. **Figure 4** depicts three interrelated pathways through which educational attainment (completed schooling) is linked with health. It is widely recognized that education can lead to improved health by increasing health knowledge and healthy behaviors. This may be explained in part by literacy, allowing more-educated individuals to make better-informed, health-related decisions—including about receipt and management of medical care—for themselves and their families (36, 99). Greater educational attainment has been associated with health-promoting behaviors (3) and earlier adoption of health-related recommendations (31).

Education also plays an important role in health by shaping employment opportunities, which are major determinants of economic resources. More-educated individuals experience lower rates of unemployment, which is strongly associated with worse health and higher mortality (4); they are more likely to have jobs with healthier physical and psychosocial working conditions, better health-related benefits (44), and higher compensation (30) (which determines affordability of health-promoting living conditions). Education may also affect health by influencing social and psychological factors. More education has been associated with greater perceived personal control (74), which has frequently been linked with better health and health-related behaviors (63, 74, 75). Greater educational attainment is generally associated with higher relative social standing; subjective social status (an individual's perception of his or her ranking in a social

hierarchy) may predict health even after controlling for more objective indicators of social status (35). More education also has been linked with increased social support (72), which is associated with better physical and mental health (5); social support may buffer the health-damaging effects of stress (110), influence health-related behaviors (24), and if one's social networks are socially advantaged, enhance access to employment, housing, and other opportunities and resources that can influence health (19).

The role of educational quality—e.g., the employment opportunities, prestige, social networks, and other advantages accompanying a degree from an elite institution—is rarely considered in health studies. Educational attainment thus can underestimate health-related differences related to education (75, 95).

Income, wealth, and health. Economic resources reflect access to material goods and services, including income (monetary earnings during a specified time period) and wealth (accumulated material assets, such as the value of one's home, household possessions, vehicles and other property, bank accounts, and investments). Theoretically, wealth may better reflect economic resources overall, but it is more difficult to measure than income and hence less frequently measured in health studies. Among studies that have included both, many (but not all) have found links between wealth and health after considering income (87). Racial/ethnic differences in income markedly underestimate differences in wealth (13).

Reverse causation (income loss due to poor health) occurs but does not fully account for the observed associations of income/wealth and health (58, 78). Many longitudinal studies show that economic resources predict health or its proximate determinants, even after adjustment for education (2, 33, 52) [although education is a stronger predictor for other outcomes (52) and both are likely to matter (13, 58)]. Health effects of increasing income have been observed in randomized and natural experiments (58).

Several researchers have observed health effects of income/wealth even after adjusting for many other relevant factors (33, 58, 62). Particularly when other socioeconomic factors are inadequately measured, however, observed associations between income/wealth and health may reflect effects of other socioeconomically linked factors such as educational attainment and quality, childhood socioeconomic circumstances, neighborhood characteristics, physical and psychosocial working conditions, and subjective social status. The health effects of low economic resources may be ameliorated by access to other resources and opportunities; for example, some relatively low-income countries/states (e.g., Cuba, Costa Rica, and Kerala, India) have favorable health indicators that may be explained by long-standing societal investments in education, social safety nets, and/or prevention-oriented medical care (41).

Income inequality (measured at an aggregate level) has often been linked with health (116), although a causal link is debated (65, 116). Income inequality could affect health by eroding social cohesion (59). The link could also be explained by other factors strongly associated with both income inequality and health, such as lack of social solidarity, which could be both a cause and an effect of income inequality.

Race, racism, and health. In the United States and many other societies, race or ethnic group is another important social factor that influences health, primarily because of racism. Racism refers not only to overt, intentionally discriminatory actions and attitudes, but also to deep-seated societal structures that—even without intent to discriminate—systematically constrain some individuals' opportunities and resources on the basis of their race or ethnic group. Racial residential segregation is a key mechanism through which racism produces and perpetuates social disadvantage (22, 117). Blacks and Latinos are more likely to reside in disadvantaged neighborhoods with inadequately resourced schools and hence to have lower educational attainment and quality

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Racial discrimination, racism: includes societal structures, such as residential segregation and social networks, that systematically perpetuate social disadvantage along racial or ethnic lines, even without conscious intent to discriminate

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(96), with resultant health effects through pathways discussed above. Racism may also affect health more directly through pathways involving stress; chronic stress related to experiences of racial/ethnic bias, including relatively subtle experiences arising even without consciously prejudicial intent, may contribute to racial/ethnic disparities in health, regardless of one's neighborhood, income, or education (80, 118). More education or income may paradoxically expose blacks or Latinos to more discrimination because of more contact with (non-Latino) whites. Race-health links could also be shaped by perceptions of how one's race—and its associations with social influence, prestige, and acceptance—affects one's relative place in social hierarchies. Associations between discrimination and health similar to those observed in the United States are being found in other countries (118).

The pervasive role of stress. Coping with daily challenges can be particularly stressful when one's financial and social resources are limited. Recent evidence implicates chronic stress in the causal pathways linking multiple upstream social determinants with health, through neuroendocrine, inflammatory, immune, and/or vascular mechanisms (71, 108). Stressful experiences—such as those associated with social disadvantage, including economic hardship (12, 40) and racial discrimination (118)—may trigger the release of cortisol, cytokines, and other substances that can damage immune defenses, vital organs, and physiologic systems (71, 101). This mechanism can lead to more rapid onset or progression of chronic illnesses, including cardiovascular disease (108), and the bodily wear and tear associated with chronic stress may accelerate aging (70, 102, 103). The accumulated strain from trying, with inadequate resources, to cope with daily challenges may, over time, lead to more physiological damage than would a single dramatically stressful event (70). A recent collection of papers summarizes current knowledge of pathways and biological mechanisms likely to be involved in the health effects of stress and other psychosocial factors—including perceived control, subjective social status, and social support (1).

The Health Effects of Social Factors Across Lifetimes and Generations

The importance of early childhood experiences. Among the strongest bodies of SDOH evidence is work considering adverse health effects of early childhood experiences associated with family social disadvantage. Many studies have shown that early experiences affect children's cognitive, behavioral, and physical development (7, 25, 53, 55), which predicts health; developmental differences have been associated with socioeconomically linked differences in children's home environments, including differences in stimulation from parents/caregivers (7, 39, 50, 114, 123). Biological changes due to adverse socioeconomic conditions in infancy and toddler years appear to become "embedded" in children's bodies, determining their developmental capacity (53). Several longitudinal studies following children from early childhood through young adulthood have linked childhood developmental outcomes with subsequent educational attainment (18, 47, 100), which is strongly associated with adult health (discussed above).

Substantial evidence indicates that pathways initiated by childhood adversity can be interrupted. Studies show that high-quality early childhood development interventions—including center-based programs to nurture and stimulate children and to support and educate parents—greatly ameliorate the effects of social disadvantage on children's cognitive, emotional/behavioral, and physical development (57); the first five years of life appear to be most crucial (55), although opportunities for intervention continue throughout childhood (55) and adolescence (42).

The intergenerational transfer of advantage and health. A rich literature over the past two decades examines how differences in social advantage can influence health both

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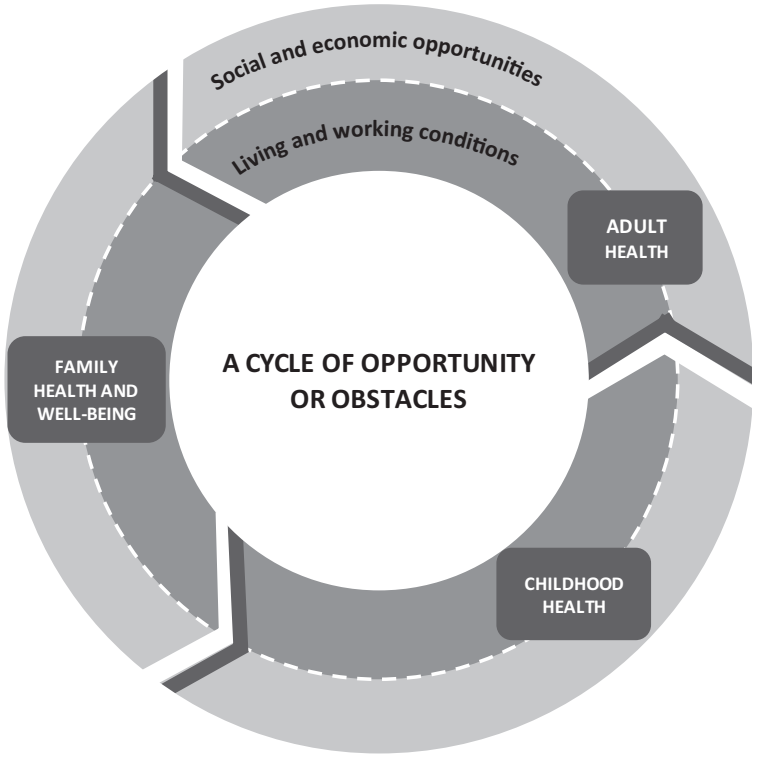


Figure 5

Social advantage and health advantage are transmitted across lifetimes and generations.

over lifetimes and across generations (9, 26, 40, 45, 46, 53, 55, 64, 66, 102, 108, 124). As illustrated in **Figure 5**, developed for the RWJF Commission, upstream social factors influence health at each life stage, with accumulating social advantage/disadvantage and health advantage/disadvantage over time. Children of socially disadvantaged parents are less healthy and have more limited educational opportunities, both of which diminish their chances for good health and social advantage in adulthood. Emerging research on gene-environment interactions suggests that the intergenerational transmission of social advantage and health may be partially explained by epigenetic changes in gene expression, which in turn are passed on to subsequent generations (61).

ADDRESSING THE KNOWLEDGE GAPS

Gaps in Current Knowledge about the Social Determinants of Health

A large body of evidence from observational research strongly and repeatedly links multiple upstream social (including economic) factors with a wide array of health outcomes, and understanding—albeit incomplete—of underlying pathways and biological mechanisms has been growing. With notable exceptions, however, we know little about effective ways to address social factors to improve health and reduce health disparities—about when, where, and how to intervene.

The gaps in knowledge reflect several challenges. More often than not, the relationships

between upstream social factors and health are complex and play out over long periods of time, involving multiple intermediate outcomes subject to effect modification by characteristics of people and settings along the causal chain. This complexity makes it difficult to learn about the specific pathways through which upstream social factors shape health and to identify priorities for intervention. Addressing the knowledge gaps is also complicated by our limited ability to measure upstream social factors. Current measures do not fully capture—or tease out the distinct effects of—relevant aspects of income, wealth, education, or occupational rank. For example, the observed effects of race/ethnicity on adult health after adjustment for available socioeconomic measures suggest a potential role for unmeasured social influences (13)—e.g., childhood circumstances, neighborhood characteristics, accumulated wealth, racial discrimination. Development of better measures of these influences is in its infancy (13, 37, 80, 118). Research funding is also an issue. Most U.S. research funding supports studies of single diseases rather than causal or contributory factors with effects that manifest across multiple diseases, putting SDOH research at a disadvantage. The health effects of upstream social factors—or interventions to address them—may not manifest for decades or generations; longitudinal studies are expensive and access to longitudinal databases is particularly limited in the United States (9). Conducting randomized trials, the gold standard for establishing effectiveness in health sciences, is particularly challenging for upstream interventions.

Priorities for Further Research

Investment at this time would be particularly strategic in several areas. Research to improve the measurement of social factors is an important requisite for effective efforts in all of the following areas.

Descriptive studies and monitoring. Ongoing descriptive research is needed to monitor changes over time both in the distributions of key upstream social factors (e.g., income, wealth, and education) across groups defined by race/ethnicity, geography, and gender, and in their associations with health outcomes in specific populations and settings. Interpreted in light of relevant policies, these findings can indicate the extent to which social and health disadvantage affects different groups and gauge progress toward improving health and reducing health disparities.

Longitudinal research. We need more life-course research, including longitudinal studies to build public-use databases with comprehensive information on both social factors and health, collected over time frames long enough—ideally multiple generations—for health consequences of early childhood experiences to manifest. A more reasonable balance is needed between investments in studying adult disease and examining children's trajectories of health and social advantage across the life course.

Connecting the dots: linking knowledge to elucidate pathways and assess interventions. Even robust longitudinal data are unlikely to provide sufficient information for tracing the effects of an upstream determinant (A) through relevant pathways to its ultimate health outcomes (Z), particularly if exposure to A occurs in childhood and outcome Z occurs much later. Attempting to document and quantify the effects of A on Z in a single study represents an important obstacle to understanding how social factors influence health—and how to intervene. Considering the potential for effect modification by characteristics of people and contexts at each step of multiple complex causal pathways, the consistency of existing findings linking upstream social determinants with distal health outcomes seems remarkable.

To strengthen our understanding of how upstream social factors shape health, we need to connect the dots by building the knowledge base incrementally through linking a series of distinct studies (perhaps spanning multiple disciplines) that examine specific segments of the

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pathways connecting A to Z. For example, one study could test the effects of an upstream determinant on an intermediate outcome, which then could be the independent variable in subsequent studies of increasingly downstream intermediate outcomes; no single study would be expected to span all steps from A to Z. Once the links in the causal chain are documented, a similar incremental approach could be applied to study the effectiveness of interventions, e.g., testing the effects of an upstream intervention on an intermediate outcome with established links to health. This approach to advancing knowledge is not new: Medicine and public health often rely on evidence from studies of intermediate outcomes (e.g., obesity) with demonstrated links to other outcomes (e.g., diabetes or cardiovascular disease) (11). Although not definitive, the knowledge gained from connecting the dots can be compelling when confirmed in multiple studies; furthermore, policy makers must recognize that the limited generalizability of findings from randomized experiments introduces uncertainty as well (11).

Testing multidimensional interventions versus seeking a magic bullet. We need research to inform translation of existing knowledge about the SDOH into effective and efficient policies. Often, the rate-limiting step may not be insufficient knowledge of pathways but rather lack of solid evidence about what, specifically and concretely, works best in different settings to reduce social inequalities in health. For example, although we have convincing evidence that educational quality and attainment powerfully influence health through multiple pathways, lack of consensus about interventions is often invoked to justify inaction. Knowledge of pathways can point to promising or at least plausible approaches but generally cannot indicate which actions will be effective and efficient under different conditions; that knowledge can come only from well-designed intervention research, including both randomized experiments (when possible and appropriate) and nonrandomized studies with rigorous attention to comparability and bias.

Intervention research often seeks to identify the magic bullet that will yield results on its own, a stand-alone intervention with independent effects after adjusting for other factors. This notion may be reasonable when considering surgery, but the complex pathways linking social disadvantage to health suggest that seeking a single magic bullet is unrealistic. Interventions with individuals may require simultaneous efforts with families and communities. Recognizing the expense and methodologic challenges, we need multifaceted approaches that operate simultaneously across domains to interrupt damaging (and activate favorable) pathways at multiple points at which the underlying differences in social advantage and the consequent health inequalities are produced, exacerbated, and perpetuated.

Other issues must also be addressed. Research funding must be expanded beyond a focus on single diseases and/or biomedical factors exclusively. The time frame for evaluating program or policy effectiveness should be extended (11). Researchers must be trained in the concepts, measures, and methods needed both to study SDOH and their interactions with biomedical factors (e.g., gene-environment interactions) and to consider social factors in clinical and laboratory studies focused on other questions.

Political barriers to translating knowledge to action. The field of SDOH is coming of age in many ways, with respect to increased attention within and beyond academia; documentation of strong and pervasive links between social and economic factors and health; and the accumulation of knowledge of pathways and biological mechanisms that provide a scientific foundation for appreciating the role of social factors in health. Although associations between social factors and health are no longer in question, we have much to learn, both about the underlying processes linking upstream social determinants and most health outcomes and about effective ways to intervene.

Lack of evidence, however, is not always the major barrier to action. Often, the chief

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obstacle is lack of political will; particularly in the United States, our deeply embedded culture of individualism can impede actions that require a sense of social solidarity. For example, as noted in an Institute of Medicine report, "whether early childhood programs can make a difference has been asked and answered in the affirmative innumerable times"; the remaining questions are about the most effective and efficient interventions (55). Even after major business groups have advocated universal high-quality preschool as essential for achieving a productive—i.e., healthy and educated—future workforce (16, 28, 86), this goal remains elusive.

Descriptive, explanatory, and interventional research can play a supportive role in building consensus about the need for action by increasing public and policy-maker awareness of unacceptable conditions such as racial and socioeconomic disparities in health; by making the links between social factors and health meaningful and plausible to the public and policy makers; and by suggesting, testing, and helping to estimate the costs of promising science-based approaches. Information about the pathways and mechanisms through which social advantage influences health can provide an important counterweight to victim-blaming, which too often impedes policies focused on upstream social and economic factors. Based on current understanding of the role of stress in the links between multiple social factors and health outcomes, studies of pathways involving stressful circumstances and physiological responses to stress may yield knowledge needed to help achieve consensus for action. Research on the SDOH can provide practical guidance for policies and add meaning and credibility to ethical and economic arguments for the need to act, not only to ameliorate the adverse health consequences but also to reduce social disadvantage itself.

SUMMARY POINTS

1. A critical mass of knowledge related to the social determinants of health has accumulated in the United States and elsewhere, documenting associations, exploring pathways and biological mechanisms, and providing a previously unavailable scientific foundation for appreciating the fundamental role of social factors in health.
2. The questions are no longer about whether social factors are important influences on health, but rather about how social factors operate and how we can most effectively intervene to activate health-promoting pathways and interrupt health-damaging ones.
3. Too little attention has been given to the upstream social determinants of health, such as economic resources, education, and racial discrimination. Although most research has focused on the more easily studied and addressed downstream factors, these upstream determinants represent the fundamental causes in pathways that influence downstream factors and ultimately lead to health effects.
4. One barrier to expanding our understanding of how upstream social determinants influence health is a widespread expectation that a single research study can encompass an entire pathway from upstream factor to downstream health effects. Such studies are unlikely to be achieved, however, given the complex causal chains and long time periods involved. Rather, we should focus on advancing knowledge of pathways incrementally by linking results from studies of specific pathway segments.
5. More research on pathways and biological mechanisms is needed, but this will not necessarily yield sufficient information for identifying the most effective and efficient interventions. Well-designed studies of interventions are essential.

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6. On the basis of experience and awareness of the complexity of pathways, isolated interventions focused on single discrete (upstream or downstream) social factors may not be effective. The challenge is to design and adequately study multidimensional interventions that address multiple factors simultaneously.
7. Lack of evidence is not always the major barrier to action on the social determinants of health. Particularly in the United States, the crucial obstacle is often lack of political will. A strategic research agenda on the social determinants of health should also address the factors that can enhance or impede political will to translate knowledge into effective action.

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DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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Kumanyika, S. 2017. Getting to equity in obesity prevention: A new framework. Washington, DC: National Academy of Medicine. https://nam.edu/getting-to-equity-in-obesity-prevention-a-new-framework/

DISCUSSION PAPER

Getting to Equity in Obesity Prevention: A New Framework

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January 18, 2017

High obesity prevalence persists as a major issue for societies globally (IOM, 2012; WHO, 2013). Chronic overweight and obesity have high health, social, and economic costs (Hammond and Levine, 2010), and the benefits of achieving and maintaining healthy weight for overall health and well-being are well established (Horton, 2009; IOM, 2012; Wing et al., 2011; Zomer et al., 2016). Obesity in children and adolescents is of particular concern because it may compromise physical and psychosocial development and set the stage for early onset of adverse health effects that accumulate over a lifetime (IOM, 2005). Relevant to the topic of this discussion paper, obesity is also a health equity issue. Social disadvantage tends to intensify the exposure to obesity-promoting influences (Braveman, 2009; May et al., 2013). The challenge of preventing and controlling obesity includes the need to assure that socially disadvantaged populations benefit from relevant public health interventions (IOM, 2013).

Population-wide obesity and its health consequences are linked to eating and physical activity patterns that have become ways of life in modern societies (IOM, 2012; Kumanyika et al., 2008; WHO, 2000). This is a global problem, but one for which solutions must be tailored to national and subnational contexts (WHO, 2000). Human physiologic systems for regulation of food intake are well developed for responding to hunger but poorly developed for curbing overeating, and they evolved when routine physical activity levels were much higher than they are now. Thus, it is often said that from an evolutionary perspective widespread obesity reflects a natural response to an unnatural environment. On the energy intake side, this unnatural environment is characterized by ubiquitous, heavily advertised, and highly palatable high-calorie foods and beverages and large portions of restaurant meals; these all promote caloric overconsumption. On the energy output side, the unnatural environment is evident in residential areas where cars are a common form of transportation or where mobility depends on using a car, in sedentary work environments that limit physical activity, and where sedentary entertainment is readily available, affordable, and heavily promoted.

Our communities are laden with obesity-promoting influences that often overwhelm efforts of individuals to control their weight. The current public health priority for transforming environments to be more supportive of healthy eating and physical activity recognizes this reality. **Tables 1 and 2** list various types of obesity-promoting influences in daily living environments (microenvironments) as well as factors farther upstream (macroenvironments). These tables are adapted from *Preventing Childhood Obesity: Health in the Balance* (IOM, 2005). This report was among the earliest U.S. efforts to shift the obesity intervention paradigm toward public health approaches. The tables depict the spectrum of factors and environments that influence eating and physical activity. The focus of this perspective is on those factors that are amenable to modification by altering existing public or private policies or by establishing new ones.

Table 1| Examples of Environmental Influences on Food Intake, by Type of Environment

Size or Level of Environment	Type of Environment: Food-Related Influences			
	Physical	Economic	Policy/Political	Sociocultural
Microenvironments (e.g., behavioral settings such as homes, schools, and communities)	•Location and type of food stores •Vending machine placement and products •Point-of-purchase information •Local food production	•Locally imposed taxes •Vendor pricing policies •Financial support for health promotion programs •Sponsorship of healthful food policies and practices	•Family rules related to food purchasing and consumption •Food policies of local schools and districts	•"Ethos" or climate related to food and eating in the home, school, and neighborhood •Role models for eating behaviors at home, in school, and in community settings (e.g., churches)
Macroenvironments (e.g., societal sectors such as food and agriculture, education, medical, government, public health, or health care)	•Food production/ •importing •Food manufacturing •Food marketing •Federal nutrition labeling guidelines	•Costs of food production, manufacturing, and distribution •Taxes, pricing policies, subsidies •Wage structure and other factors that influence personal and household income	•National food and nutrition policies, regulations, and laws, including food labeling •Food industry standards and practices •Regulations and guidelines on advertising to children	•Mass media influences on food selections and eating behaviors •General consumer trends in food and eating

Source: Adapted from Swinburn et al., 1999; IOM, 2005

Table 2| Examples of Environmental Influences on Physical Activity, by Type of Environment

Size or Level of Environment	Type of Environment			
	Physical	Economic	Policy/Political	Sociocultural
Microenvironments (e.g., behavioral settings such as homes, schools, and communities)	•Sidewalks and footpaths •Cycle paths •Public transportation •Street lights •Recreational facilities and clubs	•Cost of gym memberships •Budget allocations for recreation centers or walking and cycling paths •Funding for improved public transportation •Sponsorship of physical activity-related health promotion •Influences on household income and time expenditures	•Family rules about television watching •Family rules about household chores •Restrictions on bicycle or pedestrian traffic •Zoning for protection of green spaces •Building codes	•"Ethos" or climate related to physical activity and inactivity in the home, school, and neighborhood •Role models for physical activity and inactivity in the home, school, and neighborhood
Macroenvironments (e.g., societal sectors such as food and agriculture, education, medical, government, public health, or health care)	•Automobile industry	•Public transport funding and subsidies	•State-level policies on physical education in schools	•Mass media influences on physical activity and inactivity •General consumer trends patterns of physical activity and inactivity

Source: Adapted from Swinburn et al., 1999; IOM, 2005

Published January 18, 2017

A General Framework for Obesity Prevention in the United States

The 2012 Institute of Medicine (IOM) Committee on Accelerating Progress in Obesity Prevention (APOP) (2) (IOM, 2012) developed strategies and action plans that have become a reference point for current U.S. obesity prevention efforts with both children and adults. The APOP study committee reviewed hundreds of recommendations for preventing obesity and arrived at five recommendations, 20 accompanying strategies for implementing these recommendations, and a number of potential action steps for each strategy (IOM, 2012). Taken together, the recommendations, strategies, and action steps form a comprehensive strategy to foster obesity prevention in key environments or "settings." The approach was grounded in a systems perspective to encourage actions within and across settings that were complementary and could be mutually reinforcing **(Figure 1)**.

Characteristics of the settings in the APOP framework define the overall context for choice options, motivations, and actions regarding eating and physical activity for individuals and communities. Potential targets for interventions in these settings include the types of foods available in neighborhoods and settings such as schools, child care facilities, or worksites; food prices; advertising and promotion of unhealthy foods and beverages; public transportation; traffic patterns, air quality, and other aspects of neighborhood safety and quality; and access to parks and recreational facilities. These factors are difficult to change.

The APOP framework also highlights the roles of engagement and leadership in effecting changes in these environments. Environments related to healthy eating and physical activity are not only a part of the fabric of everyday life, they also reflect processes that are useful to communities in other ways and are, therefore, protected by a combination of public policies, commercial interests, and public preferences. For example, school policies may limit time for physical education in favor of more time for academics. Community design practices that are efficient for automobile transportation and suburban living may take priority over configurations that make it possible for children to walk to nearby schools.

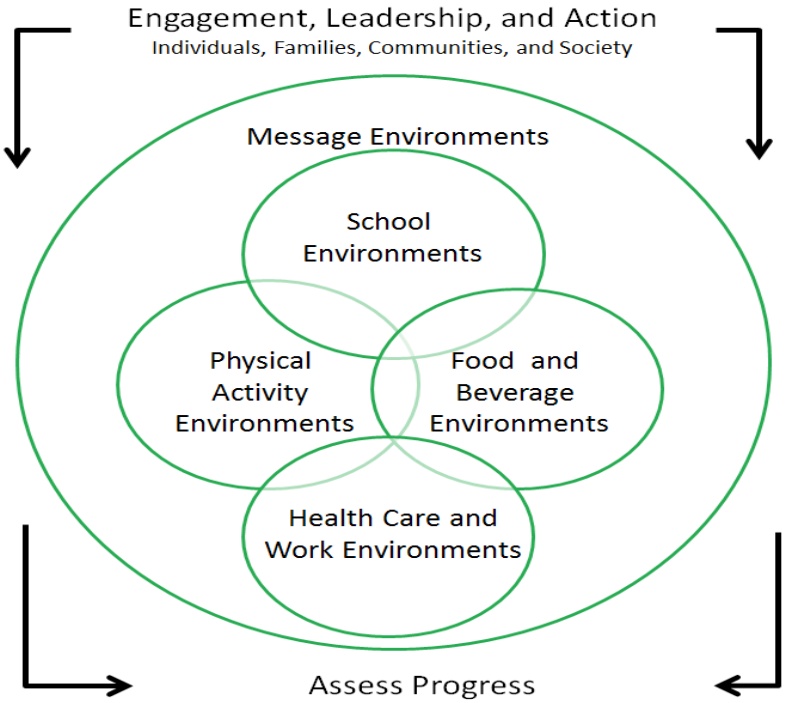


Figure 1 | Comprehensive approach of the Committee on Accelerating Progress in Obesity Solutions. *Source: IOM, 2012.*

Health Equity Considerations

We continue to observe substantially higher obesity prevalence in U.S. racial/ethnic minorities compared to white populations. For example, in National Health and Nutrition Examination Survey data based on measured weights and heights, 48 percent of non-Hispanic black adults and 43 percent of Hispanic adults had obesity, compared to 35 percent of non-Hispanic whites (Ogden et al., 2015). The figures for obesity prevalence in 2- to 19-year-old youth were 20 percent and 22 percent for non-Hispanic black and Hispanic youth, respectively, compared to 15 percent in non-Hispanic white youth (Ogden et al., 2015). The self-reported data from the National Health Interview Survey indicate higher obesity prevalence in American Indians/Alaska Native adults (44 percent) and Native Hawaiians or other Pacific Islanders (35 percent), compared to non-Hispanic whites (29 percent) (National Center for Health Statistics, 2016). Higher obesity prevalence in association with lower socioeconomic status (SES) is also a frequent finding (May et al., 2013; Ogden et al., 2010a,b), although in the United States this finding is less consistent within racial/ethnic minority populations than in whites. Also, trends in obesity prevalence are sometimes less favorable for racial/ethnic minority or low SES population subgroups than those observed for non-Hispanic white or higher SES groups; in such cases, disparities are actually widening (CDC, 2015; Frederick et al., 2014; Robbins et al., 2015).

These differences in obesity prevalence and trends are not chance occurrences. Although obesity-promoting forces are embedded in the social fabric of daily living and affect the whole population, the finding that above-average obesity prevalence is often associated with low SES or racial/ethnic minority status is not uncommon in high-income countries like the United States (Kumanyika et al., 2012; Loring and Robertson, 2014). Population groups whose opportunities and social agency have been systematically and unfairly curtailed tend to be more exposed to obesity-promoting environmental influences and less able to avoid the associated adverse effects on eating and physical activity. This makes obesity a health equity issue rather than simply one of health differences between population groups that are otherwise comparable in social position and opportunities.

The APOP report (IOM, 2012, p. 26) acknowledged that challenges in social, political, and historical contexts influence the feasibility and relevance of interventions designed to improve options for healthy eating and active living, stating in the opening chapter of the report:

> *Not all individuals, families, and communities are similarly situated with respect to environments that influence food and physical activity…In many parts of the United States, racial/ethnic minority and low-income individuals and families live, learn, work, and play in neighborhoods that lack sufficient health-protective resources, such as parks and open space, grocery stores, walkable streets, and high-quality schools (Adler et al., 2007; Iton et al., 2008). The persistence of concentrated health disparities in many American communities is strongly influenced by the relative paucity of community-based health improvement strategies focused on creating robust local participatory decision-making processes.*

Although the APOP committee did not find evidence to support recommendations for specific population subgroups, it advanced a vision in which solutions would be sensitive to contexts and oriented toward achieving equity (IOM, 2012). Unless addressed through specially designed interventions, the disproportionately high exposure to a variety of obesity-promoting factors in socially disadvantaged communities may limit the effectiveness of interventions that benefit the population at large. Closing gaps will actually require interventions that work better in these populations than they do in white or more advantaged populations. Equivalent or better impacts in advantaged compared to disadvantaged populations mean that gaps in obesity prevalence will widen rather than become smaller (Chung et al., 2016; IOM, 2012).

An Equity-Oriented Obesity Prevention Framework

Thus, as useful as the APOP framework and recommendations have been and will continue to be, they do not provide specific guidance on how to develop strategies that will lead to equity of impact. Although the idea that populations with a more challenging context for change would require specially tailored approaches may seem like common sense, the fact that specially designed programs require additional resources may cause policy makers to favor one-size-fits-all strategies. The need for a framework that enables an explicit focus on equity is supported by the principle of

"proportionate universalism," or having the same goals for all in terms of outcomes, but applying interventions selectively according to circumstances and in proportion to need to achieve these outcomes (Carey et al., 2015; Loring and Robertson, 2014).

The process of getting to equity in achieving healthy weight cannot move forward until certain societal determinants of obesity are altered. The fact that this is a long-term proposition can discourage action because of uncertainty about how to proceed. A strategy that includes efforts with both short- and long-term payoffs is essential, but now is the time to begin in earnest. We can now identify the key environments to be targeted for change in obesity prevention, as well as goals, strategies, and actions relevant to the population as a whole. We can also recognize the various types or sources of inequities in social and environmental context factors that pose challenges for effective interventions (IOM, 2012, 2014). In addition, there is increasing emphasis not only in the field of obesity prevention but also in public health policy and practice more broadly on comprehensive community health improvement strategies. These strategies leverage the missions and resources of many societal sectors with an explicit emphasis on addressing social determinants of health (APHA, n.d.; Kania and Kramer, 2011; Koh et al., 2011; RWJF, 2015). Thus, the concepts needed to move forward with an equity-oriented obesity prevention strategy are in place. A proposed framework for an operational approach to such as strategy is shown in **Figure 2.**

The framework has four quadrants representing "process" categories that complement the settings-oriented perspective in the APOP framework. These

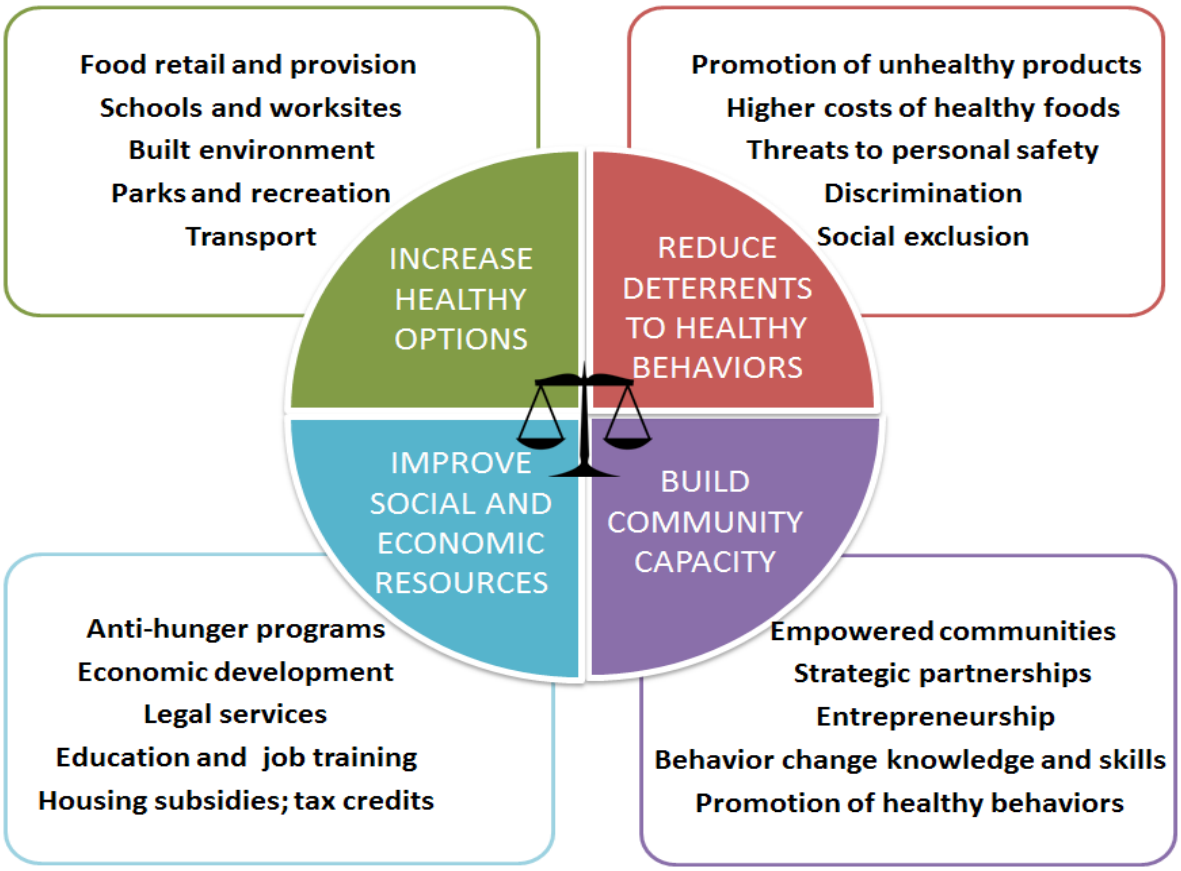


Figure 2 | Proposed equity-oriented obesity prevention action framework to assist in selecting or evaluating combinations of interventions that incorporate considerations related to social disadvantage and social determinants of health.

process variables emerge when one asks: "What is it we are trying to accomplish in these settings?" Asking this question leads to a people-oriented perspective that supports a classification of interventions according to how they affect people in communities or population subgroups. Theoretically, the elements of this framework are applicable to any population or community. However, as shown here, they are designed to highlight pathways whereby inequities can be mitigated. Each of the four categories is explained below. The items within each category are not intended to be exhaustive or highly specific; rather, they are selected as examples that illustrate potential intervention targets or approaches.

Increase Healthy Options

This category focuses on interventions that are core to many obesity prevention recommendations for environmental and policy change generally (e.g., as exemplified in the APOP recommendations (3)) and are particularly important from an equity perspective. Examples include improving locations and in-store marketing practices of supermarkets; implementing standards for food provision in schools and child care settings, worksites, and public places; improving availability and quality of parks and recreational facilities; and improving neighborhood walkability, transit systems, or other neighborhood conditions.

Reduce Deterrents to Healthy Behaviors

The focus in this category is on improving the balance of health-promoting and health-damaging exposures by decreasing messages promoting unhealthy foods or behaviors, making unhealthy options less affordable, and otherwise reducing physical and social conditions that discourage healthy behaviors. Measures to decrease targeted marketing of unhealthy foods and beverages to children would have a disproportionate benefit for children in ethnic minority populations, who are exposed disproportionately to targeted marketing for such products. Taxing or reducing access to sugary beverages would fit within this category as would policies and programs that remove blight, decrease crime, or prohibit unfair (whether intended or inadvertent) exclusions of people from pathways to health because of their demographic characteristics.

Improve Social and Economic Resources

This category goes beyond what is typically included in frameworks for promoting healthy eating and physical activity but is core to efforts to address inequities. It calls for specific attention to solutions that, although not directly focused on health, have well-documented effects on health, such as mitigating poverty and improving employment options, as well as improving social and housing conditions. Antihunger programs such as the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or child nutrition programs (including the Child and Adult Care Food Program) fit here because they increase food purchasing power or provide economic relief through direct food provision. Legal services could be relevant in several ways for removing discriminatory policies and advocating for policies or provisions to improve equity within policies. Examples include changing land use or zoning policies, enforcing equal opportunity and housing policies, or assisting with interactions with the criminal justice system.

Build Community Capacity

This category is of particular importance for an equity focus because it emphasizes the importance of community engagement, meaning directly involving community members in a process of reflecting on, selecting or designing, implementing, and evaluating outcomes of interventions with a health or resources focus. Community engagement employs processes that support the individual and collective ability of people in a given intervention setting to act effectively on their own behalf within their living and working environments, and in ways they perceive as consistent with their interests, identities, and aspirations (Bandura, 2006; IOM, 2012). Collective efficacy (community members' confidence in the ability to succeed in taking actions to improve their circumstances) can also be addressed in interventions (Kumanyika et al., 2012). Strategic partnerships may involve different types of organizations within a community: across public sectors such as housing, education, transportation, and economic development; among civic and health organizations; and throughout academic and private sectors as well. As noted above, such

partnerships are now considered fundamental to community health improvement in general. Entrepreneurship is included to suggest a role for approaches that build capacity, such as business development in low-resource communities, in addition to approaches that depend on public funding or philanthropy for revenue streams. As previously shown in Figure 2, increasing capacity also includes the concept of increasing awareness of and receptivity to improved options for healthy eating and physical activity and other aspects of health and well-being (mobilizing demand) through increased health knowledge, food and nutrition literacy, exposure to campaigns that market healthy foods and active living options, and direct experiences with healthy products and activities.

The Potential for Synergy

The scales of justice in the center of the figure signify the theoretical likelihood that an impact on equity in the ability to prevent obesity is most likely when complementary interventions from all four categories are undertaken in concert in a way that can be synergistic, or mutually reinforcing. This four-pronged approach is consistent with the general principle that coordinated multifactorial solutions are needed to address complex public health problems such as obesity. It also underscores the need for intervention packages that incorporate direct actions on social determinants of health in order to generate effective, sustainable, and equitable solutions.

Achieving Equity of Impact

The application of this Equity-oriented Obesity Prevention Action Framework can be informed by an emerging body of evidence that identifies key aspects of approaches likely to foster equitable obesity prevention solutions (Backholer et al., 2014; Beauchamp et al., 2014; Boelsen-Robinson et al., 2015; CDC, 2014; Taylor et al., 2015). One aspect is intentionality, meaning the deliberate selection or design of health interventions with an awareness of what resources and capacity are required for them to be effective in a given population group and taking steps to ensure that these resources are provided. This is a type of proportionate universalism that is broader than only attending to the aspects of the intervention that are directly health related or controlled by the health sector. This approach ultimately requires creating multidisciplinary teams and reaching across sectors to generate whole community approaches that are built on a solid foundation of community engagement.

Although this equity-oriented framework has yet to be applied in practice, one can envision various approaches to its use with a specific demographic group or within a geographic area or virtual community of interest to decide how to proceed.

A key step is convening relevant experts and stakeholder groups with knowledge of approaches in each category in the framework (type of solution), engage them to think through a coordinated strategy and identify metrics for assessing success. This approach would facilitate an environmental scan for potential policy instruments or programmatic tools that are available in each of the four categories, and particularly those in the resources, capacity, and deterrents categories that usually are considered "out of sector" from the perspective of public health or health care professionals. Such assessments would ideally be done with a specific health goal in mind even when the health goals are identified secondary to other critical community priorities for change. Assessments should also be done with an eye to identifying existing community assets, not just problems or deficits, and potential ways to build on and leverage these assets. In the process, each set of stakeholders would learn more about the different action strategies and about each other, and collectively identify relevant precedents, outcomes, and tools. Once potential interventions or approaches have been identified, the selection process would aim for synergy among a set of strategies selected from the different categories, some with longer-term goals and some with more immediate payoffs expected. Criteria for selection in addition to the potential relevance and impact of separate interventions on obesity prevention would include the potential for effects of different types of policies or programs to be mutually enhancing.

Another way to approach using the framework would be to start with proposals for specific obesity prevention strategies that have public support and political traction and analyze them to identify and consider what other interventions or resources or capacity would potentially improve their effectiveness. The subsequent process might proceed similarly to the

aforementioned approach of reaching out to other sectors, forming or joining a coalition, and moving forward with an action plan geared to complementarity and cobenefits among the participating partners.

Case Example

Philadelphia, Pennsylvania, is an urban area with a population of about 1.5 million people, of whom about sixty percent are black or Hispanic, and where the percent of people living in poverty (26 percent) or deep poverty—less than half of the poverty line—(12 percent) are highest among the 10 most populous U.S. cities (U.S. Census Bureau, 2016; Lubrano, 2014). The Philadelphia experience with childhood obesity prevention is an example of how interventions involving multiple categories in the equity-oriented framework can be effectively combined and coordinated. Progress in reducing rates of child obesity in Philadelphia includes improvements in high-risk demographic groups (Robbins et al., 2012, 2015). A case study analysis of the factors contributing to this success documented numerous and varied multilevel approaches for increasing healthy eating and physical activity options, implemented over several years and involving various actors across multiple sectors (Dawkins-Lyn and Greenberg, 2015). The most recent, widely publicized success was the passage of a sweetened-beverage tax (a deterrent to consumption of these products) for which planned uses of revenues included funding for universal prekindergarten. This has major implications for achieving educational equity (Nadolny, 2016; Sanger-Katz, 2016).

The political leverage achieved by linking the tax to a resource-related rationale rather than a primarily health rationale was contrasted with the prior, unsuccessful attempt to pass such a tax when framed in public health terms. However, both the prior effort and the ultimately successful more recent effort to pass the tax were useful in raising community awareness and building capacity, and were probably aided by a prior communications campaign to "de-market" consumption of sweetened beverages (Dawkins-Lyn and Greenberg, 2015). Going forward, adding or intensifying other complementary strategies might further enhance the equity impact of the tax and build community capacity for retaining the tax in the face of the inevitable opposition from commercial interests. Such complementary strategies include zoning measures to decrease outdoor advertising for sugar-sweetened beverages given that such ads are more common in lower-income neighborhoods (reducing deterrents) (Isgor et al., 2016; Yancey et al., 2009), restrictions on serving sugar-sweetened beverages in preschool programs, emphasizing programs in high-risk communities where this might not happen spontaneously (reducing deterrents), farm-to-school programs that reach children in public schools (increasing healthy options), and infrastructure approaches for increasing availability of acceptable potable water sources in public schools (increasing healthy options).

Healthy food financing initiatives (HFFIs) were a major aspect of the Philadelphia experience and have since been adopted nationwide as ways to improve healthy eating in communities without supermarket access or other good sources of healthy foods at affordable prices. HFFIs provide a more general example of the potential for combining interventions from different categories of the framework. These initiatives are inherently multisectoral in that they draw upon various types of fiscal and other policies in the realm of tax credits and community development to increase equity through food retailing (Chrisinger, 2016). They create venues for positive messaging and experiences through healthy in-store retailing or promotional practices, including taste-testing and food demonstrations (capacity). HFFI's can also involve healthy food subsidy programs offered under the auspices of SNAP, WIC or other nutrition and food assistance programs, such as coupons or rebates associated with the purchase of fresh fruits and vegetables.

Job creation is one of the most clearly documented community benefits of HFFIs (Chrisinger, 2016). However, reports that these initiatives may not result in improved eating patterns or weight create doubt about their effectiveness on these important public health outcomes (Cummins et al., 2014). This suggests a need to consider the assumptions and mechanisms underlying the presumed health effects of these interventions. For example, consumer capacity-building initiatives, including well-focused in-store retailing initiatives and food and nutrition literacy, may be essential for success. Placing other types of services, such as banking and health care, at the same location (resources) may serve as incentives for people to do their regular shopping at these stores.

As suggested by the Philadelphia case study overall and the example of how HFFI's implemented in underserved communities might be improved, the equity-oriented framework could also be used retrospectively for program evaluation. Elements of existing initiatives could be assessed for sensitivity to the applicable intervention contexts, complementarity in terms of the four areas of the equity-oriented framework; and potential missing elements that, if added, might improve equity impact. For example, the framework could help with identifying prerequisites for a program to work, such as whether a social marketing program related to healthy eating is only effective in combination with initiatives to increase access to affordable and popular healthy foods in the same community. Alternatively, looking across categories in the framework could lead to recognition of how the outcomes of a program in one category could affect a need in another category. Ideally this would be a positive effect (e.g., opening a new supermarket creates jobs, or greening or murals to improve scenery may reduce street crime). However, the potential to uncover unintended negative consequences must also be considered. For example, a health impact assessment (Cole and Fielding, 2007) of a proposed community development project that seems otherwise favorable might reveal aspects that need to be modified in order to avoid negative health consequences for some neighborhoods.

Concluding Comments

This equity-oriented obesity prevention action framework, which builds on the APOP framework, was developed to aid in solving obesity as a major community health problem for the populations, subgroups, and communities that face the greatest challenges in achieving and maintaining healthy weight. What it adds is a people-oriented lens where impact depends on mounting and integrating efforts related to improving health options, economic and other resources, building community capacity, and decreasing deterrents to healthy behaviors in circumstances of systematic social disadvantage.

Inequities in social structures and processes are the main drivers of population-level disparities in obesity prevalence, and addressing these drivers is critical for equity in achieving healthy weight. Use of the framework proposed here would also be expected to advance overall health equity and well-being over and above effects on weight, because the resultant types of solutions would be expected to have concurrent benefits that extend outside of the specific domains of food and physical activity. This framework can be used in conjunction with other such frameworks, including Health in All Policies (APHA, n.d.), Collective Impact (Kania and Kramer, 2011), and the Robert Wood Johnson Foundation's Culture of Health Action Model (2015). All of these population health improvement frameworks motivate and guide multisectoral, comprehensive, systems-oriented approaches to advancing community health.

In conclusion, by identifying and calling for integration across four complementary categories of solutions, this framework supports strategy development that works toward additive or synergistic effects on obesity prevention. It is consistent with the principles, processes, and current evidence about the importance of whole community interventions with a deliberate focus on equity when designing and implementing strategies for obesity prevention in the United States and abroad.

Notes

1. The author is a member of the Roundtable on Obesity Solutions of the National Academies of Sciences, Engineering, and Medicine.
2. http://www.nationalacademies.org/hmd/Reports/2012/Accelerating-Progress-in-Obesity-Prevention.aspx (accessed December 1, 2016).
3. http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2012/APOP/APOP_insert.pdf (accessed December 1, 2016).

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Suggested Citation

Kumanyika, S. 2017. *Getting to equity in obesity prevention: A new framework.* Washington, DC: National Academy of Medicine. https://nam.edu/wp-content/uploads/2017/01/Getting-to-Equity-in-Obesity-Prevention-A-New-Framework.pdf

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These profiles provide detailed demographic, language fluency (where relevant), education, economic, insurance coverage and health status information, as well as full census reports.



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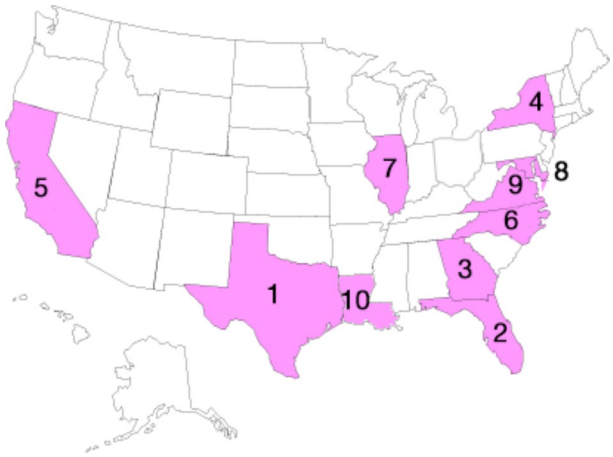
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Profile: Black/African Americans

African American Profile



(Map of the US with the top 10 states displaying the largest African American population according to the Census Bureau)

NY - CA - TX - GA - FL - NC - IL - LA - MD - VA

Overview (Demographics): In July 2015, 40.7 million people in the United States were black alone, which represents 12.7 percent of the total population. African Americans are the second largest minority population, following the Hispanic/Latino population. In 2015, most blacks lived in the South (58 percent of the black U.S. population), while 35 percent of the white population lived in the South. The ten states with the largest black population in 2015 were Texas, Florida, Georgia, New York, California, North Carolina, Illinois, Maryland, Virginia, Louisiana. Combined, these 10 states represent 59% of the total black population. Of the 10 largest places in the United States with 100,000 or more population in 2010, Detroit, Michigan had the largest proportion of blacks (84%), followed by Jackson, Mississippi (80%).

Educational Attainment: In 2015, as compared to non-Hispanic whites 25 years and over, a lower percentage of non-Hispanic blacks had earned at least a high school diploma (84.8 percent and 92.3 percent, respectively). 20.2 percent of non-Hispanic blacks have a bachelor's degree or higher, as compared with 34.2 percent of non-Hispanic whites. More black women than black men had earned at least a bachelor's degree (22.4 percent compared with 17.7 percent), while among non-Hispanic whites, a higher proportion of men than women had earned at least a bachelor's degree (34.4 percent and 34.0 percent, respectively).

Economics: According to a 2015 Census Bureau report, the average non-Hispanic black household median income was $36,515 in comparison to $61,394 for non-Hispanic white households. In 2015, the U.S. Census Bureau reported that 25.4 percent of non-Hispanic blacks in comparison to 10.4 percent of non-Hispanic whites were living at the poverty level. For 2015, the unemployment rate for blacks was twice that for non-Hispanic whites (11.4 percent and 5.0 percent, respectively). This finding was consistent for both men and women.

Insurance Coverage: In 2015, 54.4 percent of non-Hispanic blacks in comparison to 75.8 percent of non-Hispanic whites used private health insurance. Also in 2015, 43.6 percent of non-Hispanic blacks in comparison to 32.7 percent of non-Hispanic whites relied on Medicaid, public health insurance. Finally, 11.0 percent of non-Hispanic blacks in comparison to 6.3 percent of non-Hispanic whites were uninsured.

Health Conditions: The death rate for African Americans was generally higher than whites for heart diseases, stroke, cancer, asthma, influenza and pneumonia, diabetes, HIV/AIDS, and homicide.

Full Census Reports:

The Black Population: 2010 [PDF | 2.9MB]

Health Insurance Coverage in the United States: 2015 [PDF | 1.6MB]

Income and Poverty in the United States: 2015 [PDF | 3.1MB]

Census Bureau, 2016. 2015 American Community Survey 1-Year Estimates

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Profile: American Indian/Alaska Native

American Indian/Alaska Native Profile



1. Great Plains Area
2. Alaska Area
3. Albuquerque Area
4. Bemidji Area
5. Billings Area
6. California Area
7. Nashville Area
8. Navajo Area
9. Oklahoma Area
10. Phoenix Area
11. Portland Area
12. Tucson Area

Spotlight

- BRFSS Health Survey
- ACA Infographic for American Indians/Alaska Natives
- American Indian and Alaska Native Health Research Advisory Council (HRAC)
- American Indian/Alaska Native Health Disparities Program
- Circle of Life multimedia youth education program

- FY 2018 Grant Awards
- Become a Grant Reviewer
- Access to Health Care Coverage Grants
- Childhood Trauma Grants
- HIV/AIDS Grants
- Lupus Grants
- Justice and Health Grants
- Partnership Grants
- Violence Prevention Grants
- Workforce Diversity Grants
- Youth Program Grants
- Other Grants
- Planning and Evaluation

Overview (Demographics): This racial group includes people having origins in any of the original peoples of North, South America, and Central America, who maintain tribal affiliation or community attachment. As of 2012, there were an estimated 5.2 million people who were classified as American Indian and Alaska Native alone or American Indian and Alaska Native in combination with one or more other races. This racial group comprises 2 percent of the total U.S. population.

22 percent of American Indians and Alaska Natives live on reservations or other trust lands. 60 percent of American Indians and Alaska Natives live in metropolitan areas; this is the lowest metropolitan percentage of any racial group. 1.5 million American Indian and Alaska Natives are under the age of 18, which comprises 30 percent of this racial group. The 2010 Census reveals that 78 percent of the AI/AN live outside of tribal statistical areas.

Currently, there are 573 federally recognized (AI/AN) tribes, and more than 100 state recognized tribes. There are also tribes that are not state or federally recognized. Federally recognized tribes are provided health and educational assistance through a government agency called Indian Health Service (IHS), U.S. Department of Health and Human Services. The IHS operates a comprehensive health service delivery system for approximately 2 million American Indians and Alaska Natives. Typically, this urban clientele has less accessibility to hospitals; health clinics or contract health services implanted by the IHS and tribal health programs. Studies on the urban American Indian and Alaska Native population have documented a frequency of poor health and limited health care options for this group.

Since 1972, IHS has embarked upon a series of initiatives to fund health-related activities in off-reservation settings, which will make health care services accessible to urban American Indians and Alaska Natives. Currently, the IHS funds 33 urban Indian health organizations, which operate at sites located in cites throughout the United States. Approximately 600,000 American Indians and Alaska Natives are eligible to utilize this program. The thirty-three programs administer: medical services, dental services, community services, alcohol and drug abuse prevention, education and treatment, AIDS and sexually transmitted disease education and prevention services, mental health services, nutrition education and counseling services, pharmacy services, health education, optometry services, social services, and home health care.

For more information about tribal health issues:
Indian Health Service
National Indian Health Board
Urban Indian Health Institute

Language Fluency: In 2012, 20 percent of American Indians/Alaska Natives spoke a language other than English at home.

Educational Attainment: In 2012, 82 percent of American Indians and Alaska Natives alone, age 25 and over have at least a high school diploma, as compared to 92 percent of non-Hispanic Whites. 17 percent of American Indians and Alaska Natives age 25 and over have at least a bachelor's degree, in comparison to 33 percent of non-Hispanic Whites. 6 percent of American Indians and Alaska Natives have at least an advanced graduate degree (i.e., master's, Ph.D., medical, or law), as compared to 12 percent of the non-Hispanic White population.

Economics: The median household income for American Indian and Alaska Natives is $37,353, as compared to $56,565 for non-Hispanic Whites. 29 percent of American Indians and Alaska Natives age 16 and over work in management and professional occupations, in comparison to 40 percent of Whites. Also, 26 percent of this racial group live at the poverty level, as compared to 11.0 percent of non-Hispanic Whites, in 2012.

Insurance Coverage: In 2012, 47.5 percent of American Indians and Alaska Natives had private health insurance coverage. 38.1 percent of AI/ANs relied on Medicaid coverage, and 22.6 percent of AI/ANs had no health insurance coverage.

Full Census Reports:

The American Indian and Alaska Native Population: 2010 [PDF | 2.9MB]

The American Community Survey - American Indians and Alaska Natives: 2004 [PDF | 3.5MB]

Census Bureau, 2013. Income, Poverty, and Health Insurance Coverage in the United States: 2012 [PDF | 1.1MB]

Health: It is significant to note that American Indians/Alaska Natives frequently contend with issues that prevent them from receiving quality medical care. These issues include cultural barriers, geographic isolation, inadequate sewage disposal, and low income.

Some of the leading diseases and causes of death among AI/AN are heart disease, cancer, unintentional injuries (accidents), diabetes, and stroke. American Indians/Alaska Natives also have a high prevalence and risk factors for mental health and suicide, obesity, substance abuse, sudden infant death syndrome (SIDS), teenage pregnancy, liver

disease, and hepatitis.

Other Health Concerns: American Indians and Alaska Natives have an infant death rate 60 percent higher than the rate for Caucasians. AI/ANs are twice as likely to have diabetes as Caucasians. An example is the Pima of Arizona, who have one of the highest diabetes rates in the world. AI/ANs also have disproportionately high death rates from unintentional injuries and suicide. In 2012, the tuberculosis rate for AI/NAs was 6.3, as compared to 0.8 for the White population.

Selected Data by Disease/Condition

- *American Indians/Alaska Natives and Asthma.*
- *American Indians/Alaska Natives and Cancer.*
- *American Indians/Alaska Natives and Chronic Liver Disease.*
- *American Indians/Alaska Natives and Diabetes.*
- *American Indians/Alaska Natives and Heart Disease.*
- *American Indians/Alaska Natives and Hepatitis.*
- *American Indian/Alaska Natives and HIV/AIDS.*
- *American Indian/Alaska Natives and Immunization.*
- *American Indian/Alaska Natives and Infant Mortality.*
- *American Indians/Alaska Natives and Mental Health.*
- *American Indians/Alaska Natives and Obesity.*
- *American Indians/Alaska Natives and Organ and Tissue Donation.*
- *American Indian/Alaska Natives and Stroke.*

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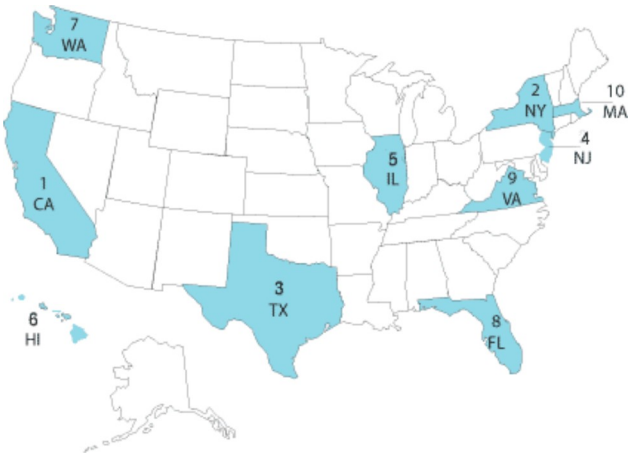
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Profile: Asian Americans

Asian American Profile



(Map of the US with the top 10 states displaying the largest Asian American population according to the Census Bureau)

CA - NY - HI - TX - NJ - IL - WA - FL - VA - MA

Overview (Demographics): This racial group is defined as people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent. According to the 2015 Census Bureau population estimate, there are 17.3 million Asian Americans, alone, living in the United States. Asian Americans account for 5.4 percent of the nation's population. In 2015, the following states had the largest Asian-American populations: California, New York, Texas, New Jersey, Illinois and Washington.

HHS Plan for Asian Americans

Read more on how HHS will raise the visibility of Asian Americans, Native Hawaiians and Pacific Islander health issues.

Language Fluency: The percentage of persons 5 years or older who "do not speak English very well" varies among Asian American groups: 51 percent of Vietnamese, 46 percent of Chinese, 23 percent of Filipinos and 21 percent of Asian Indians are not fluent in English. In 2015, 75.5 percent of Asian American spoke a language other than English at home.

Educational Attainment: According to the 2015 U.S. Census data, roughly 86.5 percent of both all Asians and all people in the United States 25 and older had at least a high school diploma. However, 52.3 percent of Asian Americans in comparison to 34.2 percent of the total non-Hispanic white population had earned at least a bachelor's degree. Among Asian subgroups, Taiwanese had the highest percentage of bachelor's degree attainment at 77 percent. In regards to employment, about 51 percent of Asian Americans were employed in management, professional and related occupations, compared with 42 percent of the white population. In addition, the proportions employed in high-skilled and managerial sectors varied from 24.3 percent for Cambodians to 73.2 percent for Taiwanese.

Economics: According to 2015 Census data, the median household income of Asian Americans is $77,368, as compared to $61,394 for non-Hispanic whites. Yet 12 percent of Asian Americans as compared to 10.4 percent of non-Hispanic whites, live at the poverty level. Economic status varies widely among Asian populations in the United States, with the poverty rate for Filipinos at 6.5 percent, as compared to 24.2 percent for the Hmong in 2015.

Insurance Coverage: In 2015, insurance coverage among Asian American subgroups varied. Private insurance coverage rates: 56 percent for Cambodian, 78 percent for Filipino, 72 percent for Chinese, 55 percent for Hmong. Public insurance coverage rates: 32 percent for Vietnamese, 25 percent for Filipino, 27 percent for Chinese, 43 percent for Hmong, and 26 percent for all Asian groups. Asian subgroups also varied within uninsured status: 12 percent for Thai, 9 percent for Vietnamese, 8 percent for Hmong.

In 2015, the overall private insurance coverage for Asian Americans was 68.8 percent, as compared to 75.8 percent for the non-Hispanic white population. 7.8 percent of Asian Americans were uninsured, as compared to 6.3 percent non-Hispanic white Americans.

Health: It is significant to note that Asian American women have the highest life expectancy (85.8 years) of any other ethnic group in the U.S. Life expectancy varies among Asian subgroups: Filipino (81.5 years), Japanese (84.5 years), and Chinese women (86.1 years)1. However, Asian Americans contend with numerous factors which may threaten their health. Some negative factors are infrequent medical visits due to the fear of deportation, language/cultural barriers, and the lack of health insurance. Asian Americans are most at risk for the following health conditions: cancer, heart disease, stroke, unintentional injuries (accidents), and diabetes. Asian Americans also have a high prevalence of the following conditions and risk factors: chronic obstructive pulmonary disease, hepatitis B, HIV/AIDS, smoking, tuberculosis, and liver disease.

Other Health Concerns: In 2015, tuberculosis was 30 times more common among Asians, with a case rate of 18.2 as compared to 0.6 for the non-Hispanic white population.

Full Census Reports:

The Asian Population: 2010 [PDF | 6.4MB]

Language Use in the United States: 2011 [PDF | 1.4MB]

Health Insurance Coverage in the United States: 2015 [PDF | 1.6MB]

Income and Poverty in the United States: 2015 [PDF | 3.1MB]

Census Bureau, 2016. 2015 American Community Survey 1-Year Estimates for Asian Americans

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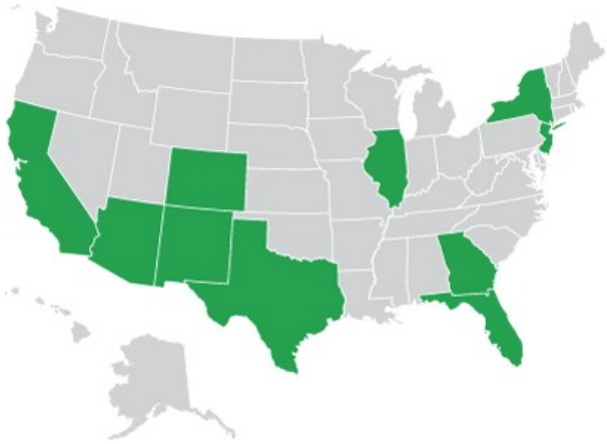
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Profile: Hispanic/Latino Americans

Hispanic/Latino Profile



(Map of the US with the top 10 states displaying the largest Hispanic/Latino population according to the Census Bureau)

NY - CA - IL - TX - AZ - CO - GA - FL - NM - NJ

Overview (Demographics): This ethnic group includes any person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. According to the 2015 U.S. Census Bureau population estimate, there are almost 56.5 million Hispanics living in the United States. This group represents 17.6 percent of the U.S. total population. In 2012, among Hispanic subgroups, Mexicans rank as the largest at 63.4 percent. Following Mexicans are: Puerto Ricans (9.5 percent), Central Americans (9.2 percent), South Americans (6.0 percent), and Cubans (3.7 percent). In 2015, states with the largest Hispanic populations are California (15.2 million), Texas (10.7 million), Florida (5 million), New York (3.7 million), and Illinois (2.2 million). Another significant point is that in 2015, 32.1 percent of Hispanics were under the age 18 in comparison to 19.1 percent of non-Hispanic whites.

Language Fluency: Language fluency varies among Hispanic subgroups who reside within the mainland United States. Census 2015 data shows that 73 percent of Hispanics speak a language other than English at home: 73% of Mexicans, 61% of Puerto Ricans, 79% of Cubans, 87% of Central Americans. 31 percent of Hispanics state that they are not fluent in English.

Educational Attainment: According to a 2015 U.S. Census Bureau report, 66 percent of Hispanics in comparison to 92 percent non-Hispanic whites have a high school diploma. 14.8 percent of Hispanics in comparison to 34.2 percent of non-Hispanic whites have a bachelor's degree or higher.

Economics: According to a 2015 U.S. Census Bureau report, 25.6 percent of Hispanics, in comparison to 14.7 percent non-Hispanic whites, work within service occupations. 20.5 percent of Hispanics in comparison to 41.7 percent of whites work in managerial or professional occupations. Among full-time year-round workers in 2015, the average Hispanic/Latino median household income was $44,782 in comparison to $61,394 for non-Hispanic whites. In 2015, the U.S. Census bureau reported that 22.6 percent of Hispanics in comparison to 10.4 percent of non-Hispanic whites were living at the poverty level.

Insurance Coverage: It is significant to note that Hispanics have the highest uninsured rates of any racial or ethnic group within the United States. In 2015, the Census Bureau reported that 47 percent of Hispanics have private insurance coverage. Among Hispanic subgroups, coverage varied as follows: 44.3 percent of Mexicans, 52.9 percent of Puerto Ricans, 55.5 percent of Cubans, 41.4 percent of Central Americans. Public health coverage varied among Hispanic subgroups: 38.3 percent of Mexicans, 45.4 percent of Puerto Ricans, 35.9 of Cubans, and 33.6 percent of Central Americans. Those without health insurance coverage varied among Hispanic subgroups: 21.5 percent of Mexicans, 8.5 percent of Puerto Ricans, 13.9 percent of Cubans and 28.2 percent of Central Americans. In 2015, 19.5

percent of the Hispanic population was not covered by health insurance, as compared to 6.3 percent of the non-Hispanic white population.

Health: Hispanic health is often shaped by factors such as language/cultural barriers, lack of access to preventive care, and the lack of health insurance. The Centers for Disease Control and Prevention has cited some of the leading causes of illness and death among Hispanics, which include heart disease, cancer, unintentional injuries (accidents), stroke, and diabetes. Some other health conditions and risk factors that significantly affect Hispanics are: asthma, chronic obstructive pulmonary disease, HIV/AIDS, obesity, suicide, and liver disease.

Other Health Concerns: Hispanics have higher rates of obesity than non-Hispanic whites. There are also disparities among Hispanic subgroups. For instance, while the rate of low birth weight infants is lower for the total Hispanic population in comparison to non-Hispanic whites, Puerto Ricans have a low birth weight rate that twice that of non-Hispanic whites. Also, Puerto Ricans also suffer disproportionately from asthma, HIVAIDS and infant mortality. Mexican-Americans suffer disproportionately from diabetes.

Full Census Reports:

The Hispanic Population: 2010 [PDF | 1.7MB]

Language Use in the United States: 2011 [PDF | 1.1MB]

Overview of Race and Hispanic Origin: 2010 [PDF | 1.9MB]

Health Insurance Coverage in the United States: 2015 [PDF | 1.6MB]

Income and Poverty in the United States: 2015 [PDF | 3.1MB]

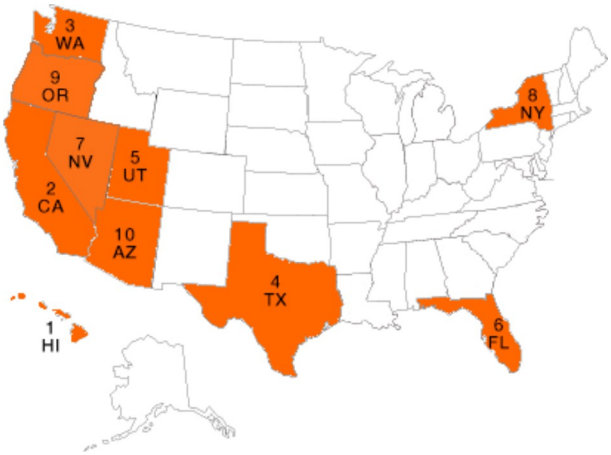
Census Bureau, 2016. 2015 American Community Survey 1-Year Estimate

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Native Hawaiian/Other Pacific Islander
- Asthma
- Cancer
- Chronic Liver Disease
- Diabetes
- Heart Disease
- HIV/AIDS
- Infant Health & Mortality
- Obesity
- Organ and Tissue Donation
- Stroke

OMH Home > Policy and Data > Minority Population Profiles > Native Hawaiian/Other Pacific Islander

Profile: Native Hawaiians/Pacific Islanders



(Map of the US with the states that have significant Native Hawaiian/Pacific Islander populations according to the Census Bureau)

HI - UT - WA - FL - TX - CA - NV - OR - NY - AZ

Overview (Demographics): This racial group refers to people having origins in any of the original peoples of Hawaii, Guam, Samoa or other Pacific Islands. According to the 2015 U.S. Census Bureau estimate, there are roughly 1.3 million Native Hawaiians/Pacific Islanders alone or in combination with one of more races who reside within the United States. This group represents about 0.4 percent of the U.S. population. Out of that number, about 370,000 Native Hawaiians or Pacific Islanders reside in Hawaii. Some other states that have a significant Native Hawaiian/Pacific Islander population are: California, Washington, Texas, Nevada, and Utah. It is also significant to note that 32 percent of this group is under the age of 18.

Most recent data from the 2010 Census show overall populations for the following U.S. Territories: American Samoa 55,519; Guam 159,358; Northern Mariana Islands 53,883. United Nations estimates for other territories in 2015 are: Federated States of Micronesia 104,000; Marshall Islands 53,000; Republic of Palau 21,000.

HHS Plan for Asian American, Native Hawaiian and Pacific Islander Health

Read more on how HHS will raise the visibility of Asian Americans, Native Hawaiians and Pacific Islander health issues.

Technical Note

Technical Note on Health Data for Native Hawaiian/Pacific Islander Populations

Educational Attainment: In 2015, 88.8 percent of Native Hawaiians/Pacific Islanders, alone or in combination, have high school diplomas or higher, as compared to 92.3 percent for whites. 21.5 percent of Native Hawaiians/Pacific Islanders have a bachelor's degree or higher in comparison to 34.2 percent of whites. 6.5 percent of Native Hawaiians/Pacific Islanders have obtained graduate degrees in comparison to 13 percent of whites. 28 percent of Native Hawaiians/Pacific Islanders speak a language other than English at home.

Economics: According to a 2015 Census Bureau report, the average Native Hawaiian/Pacific Islander household median income was $60,133 in comparison to $61,394 for non-Hispanic white households. In 2015, the U.S. Census bureau reported that 17.3 percent of Native Hawaiian/Pacific Islanders, in comparison to 10.4 percent of non-Hispanic whites were living at the poverty level.

Insurance Coverage: In 2015, 66.4 percent of Native Hawaiians/Pacific Islanders in comparison to 75.8 non-Hispanic whites used private health insurance. Also in 2015, 33.4 percent of Native Hawaiians/Pacific Islanders in comparison to 32.7 percent of non-Hispanic whites relied on public health insurance. Finally, 7.8 percent of Native Hawaiians/Pacific Islanders, in comparison to 6.3 percent of non-Hispanic whites, were uninsured.

Health: It is significant to note that in comparison to other ethnic groups, Native Hawaiians/ Pacific Islanders have higher rates of smoking, alcohol consumption, and obesity. This group also has little access to cancer prevention and control programs. Some leading causes of death among Native Hawaiians/Pacific Islanders include: cancer, heart disease, unintentional injuries (accidents), stroke and diabetes. Some other health conditions and risk factors that are prevalent among Native Hawaiians/Pacific Islanders are hepatitis B, HIV/AIDS, and tuberculosis.

Other Health Concerns: It is significant to note that in comparison to other ethnic groups, Native Hawaiians/ Pacific Islanders have higher rates of smoking, alcohol consumption, and obesity. This group also has little access to cancer prevention and control programs. Some leading causes of death among Native Hawaiians/Pacific Islanders include: cancer, heart disease, unintentional injuries (accidents), stroke and diabetes. Some other health conditions and risk factors that are prevalent among Native Hawaiians/Pacific Islanders are hepatitis B, HIV/AIDS, and tuberculosis. The tuberculosis rate (cases per 100,000) in 2015 was 30 times higher for Native Hawaiians/Pacific Islanders, with a case rate of 18.2, as compared to 0.6 for the white population.

Full Census Reports:

The Native Hawaiian and Other Pacific Islander Population: 2010 [PDF | 4.83MB]
Health Insurance Coverage in the United States: 2015 [PDF | 1.6MB]
Income and Poverty in the United States: 2015 [PDF | 3.1MB]
Census Bureau, 2016. 2015 American Community Survey 1-Year Estimates

Other Resources:

United Nations Population Information Network
U.S. Territories Summary Statistics and Estimates
U.S. Territories Contacts
United Nations World Population Prospects: The 2015 Revision

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Ethnic Differences in Visceral Adipose Tissue and Type 2 Diabetes: Filipino, African-American, and White Women

Maria Rosario G. Araneta and Elizabeth Barrett-Connor

Abstract

ARANETA, MARIA ROSARIO G. AND ELIZABETH BARRETT-CONNOR. Ethnic differences in visceral adipose tissue and type 2 diabetes: Filipino, African-American, and white women. *Obes Res.* 2005;13: 1458–1465.

Objective: To compare ethnic differences in visceral adipose tissue (VAT), assessed by computed tomography, and type 2 diabetes risk among 55- to 80-year-old Filipino, African-American, and white women without known cardiovascular disease.

Research Methods and Procedures: Subjects were participants in the Rancho Bernardo Study ($n = 196$), the Filipino Women's Health Study ($n = 181$), and the Health Assessment Study of African-American Women ($n = 193$). Glucose and anthropometric measurements were assessed between 1995 and 2002.

Results: African-American women had significantly higher age-adjusted BMI (29.7 kg/m^2) and waist girth (88.1 cm) compared with Filipino (BMI, 25.5 kg/m^2; waist girth, 81.9 cm) or white (BMI: 26.0 kg/m^2; waist girth: 80.7 cm) women. However, VAT was significantly higher among Filipino (69.1 cm^3) compared with white (62.3 cm^3; $p = 0.037$) or African-American (57.5 cm^3, $p < 0.001$) women. VAT correlated better with BMI ($r = 0.69$) and waist ($r = 0.77$) in whites, compared with Filipino ($r = 0.42$; $r = 0.59$) or African-American ($r = 0.50$; $r = 0.56$) women. Age-adjusted type 2 diabetes prevalence was significantly higher in Filipinas (32.1%) than in white (5.8%) or African-American (12.1%) women. Filipinas had higher type 2 diabetes risk compared with African Americans [adjusted odds ratio, 2.30; 95% confidence interval (CI), 1.09 to 4.86] or whites (adjusted odds ratio, 7.51; 95% CI, 2.51 to 22.5) after adjusting for age, VAT, exercise, education, and alcohol intake.

Discussion: VAT was highest among Filipinas despite similar BMI and waist circumference as whites. BMI and waist circumference were weaker estimates of VAT in Filipino and African-American women than in whites. Type 2 diabetes prevalence was highest among Filipino women at every level of VAT, but VAT did not explain their elevated type 2 diabetes risk.

Key words: visceral adipose tissue, Asian, computed tomography, health disparities, fat distribution

Introduction

Elevated type 2 diabetes prevalence has been reported among African Americans, Latinos, Native Americans, and Pacific Islanders compared with whites, and the excess has been attributed to ethnic differences in obesity (1). However, Filipinos, Japanese, and Chinese have higher type 2 diabetes prevalence than whites despite similar body size (2). The University of California San Diego (UCSD)[1] Filipino Women's Health Study showed that 50- to 69-year-old Filipino women had over 3 times the prevalence of type 2 diabetes (33%) than white women (9%) of similar age, BMI, waist-to-hip ratio, and percentage body fat (by DXA) (3). Furthermore, truncal fat (by DXA) was independently associated with type 2 diabetes risk among white but not among Filipino women (3).

Received for review December 21, 2004.
Accepted in final form June 1, 2005.
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[1] Nonstandard abbreviations: UCSD, University of California San Diego; IR, insulin resistance; VAT, visceral adipose tissue; CT, computed tomography; EBCT, electron beam CT; CHD, coronary heart disease; HOMA, homeostasis model assessment; WHO, World Health Organization; OR, odds ratio; CI, confidence interval.

Central obesity is a known risk factor for type 2 diabetes and may induce insulin resistance (IR) by reducing insulin-mediated glucose disposal. Studies of Asian Indians suggest more visceral adipose tissue (VAT) compared with whites of similar BMI (4). However, African-American women have less VAT than white or Mexican-American women of similar BMI (5,6). Ethnic differences in type 2 diabetes prevalence could reflect ethnic differences in VAT. However, estimates of central obesity including waist circumference, waist-to-hip ratio, and truncal fat measurements by DXA do not distinguish visceral from subcutaneous fat and may not adequately estimate visceral adiposity. Computed tomography (CT) provides a direct estimate of VAT and subcutaneous fat (7).

The objectives of this study were to compare correlates of obesity, including BMI, waist girth, waist-to-hip ratio, and truncal fat by DXA with visceral and subcutaneous fat among 55- to 80-year-old community-dwelling Filipino, African-American, and white women without known cardiovascular disease and to compare ethnic differences in the prevalence of type 2 diabetes after adjusting for VAT and other known risk factors.

Research Methods and Procedures

Study Population

Filipino women were recruited between 1995 and 1999 to a cross-sectional study designed to estimate the prevalence of several chronic conditions, including osteoporosis, cardiovascular disease, hypertension, and type 2 diabetes (3). Population-based sampling was not possible because Filipinos were not identified separately in the 1990 census; consequently, a convenience sample was recruited from San Diego, CA, as described elsewhere (3). African-American women were participants of the UCSD Health Assessment Study of African-American Women, a cross-sectional study of osteoporosis, cardiovascular disease, hypertension, and type 2 diabetes conducted between 1995 and 1999. The comparison group of non-Hispanic white women (primarily of Northern European descent) were participants in the UCSD Rancho Bernardo Study, a San Diego community-based longitudinal study (8). From 1997 to 1999, ~70% of surviving local, non-institutionalized members from the Rancho Bernardo cohort participated in a study of the same chronic diseases using the same research protocol. For comparison with the middle to upper middle class Rancho Bernardo cohort, an effort was made to recruit Filipino and African-American women of similar education and social class.

VAT was assessed between 2000 and 2002, using electron beam CT (EBCT) and the same protocol, clinical facility, and research staff (9). Filipino, African-American, and white postmenopausal women, who were then 55 to 80 years old, and without a history of myocardial infarction, angina pectoris, or coronary artery revascularization, were invited. Among age-eligible participants without known coronary heart disease (CHD), 79% of Filipinas, 78% of African-American women, and 82% of white women joined the EBCT study. All participants gave written informed consent, and the research protocol, consent forms, and data instruments were approved by the UCSD Human Research Protections Program.

Clinical Evaluation

Demographic characteristics, lifestyle characteristics (cigarette smoking, alcohol use, physical activity), physician-diagnosed diseases, hospitalizations, and surgeries were determined using structured questionnaires. A self-administered questionnaire was used to assess whether participants engaged in exercise or labor at least three times a week (for 30 minutes). Specific information on the frequency and duration of specific activities including but not limited to walking, jogging, dancing, playing golf, and gardening were collected but were not used for this analysis. Participants who were using prescription or non-prescription medications in the month before the clinic visit brought pills and prescriptions to the clinic to be verified and recorded by a nurse.

Height and weight were measured with participants wearing lightweight clothing without shoes. BMI (kilograms per meter squared) was computed as an estimate of obesity. Waist circumference was measured at the narrowest circumference. Hip circumference was measured at the largest circumference. Percentage of total body and truncal fat were determined by DXA (model QDR-2000 X-ray bone densitometers; Hologic, Inc., Waltham, MA).

A 75-gram oral glucose tolerance test was administered in the morning after a minimum 8-hour fast; blood samples were obtained by venipuncture at 0 and 2 hours. Plasma glucose was measured by the glucose-oxidase method, and insulin was determined by radioimmunoassay in a diabetes research laboratory. The homeostasis model assessment (HOMA) was used to estimate IR (10).

Type 2 diabetes was defined using the 1999 World Health Organization (WHO) criteria: fasting plasma glucose level $\geq$ 126 mg/dl, or 2-hour postchallenge glucose level $\geq$200 mg/dl, or a history of type 2 diabetes diagnosed by a physician, or treatment with an oral hypoglycemic agent or insulin (11). Lower waist and BMI cut-off points for Asians were applied to define large waist girth (Filipinas, >80 cm; white and African-American women, >88 cm) and overweight (Filipinas, BMI $\geq$ 23 kg/m^2; white and African-American women, BMI $\geq$ 25 kg/m^2) (12).

Visceral and subcutaneous fat were determined using an Imatron C-150 ultrafast CT scanner. A single-slice CT scan of the abdomen (at the umbilicus) was obtained to measure visceral and subcutaneous adipose tissue volume.

Table 1. Age-adjusted demographic, behavioral, and anthropometric characteristics among Filipino, white, and African-American women, 55- to 80-years-old, San Diego, 1995 to 2002

	Filipino (n = 181)	White (n = 196)	African American (n = 193)
Age (years)	64.4*†	66.7	66.7
College graduate	52.5%†	36.8%	44.6%
Smoker (ever)	13.3%*†	50.0%	50.3%
Alcohol (≥3 drinks/wk)	1.1%*†	62.2%‡	18.0%
Exercise (≥3 times/wk)	70.2%	72.4%	61.7%‡
BMI (kg/m^2)	25.5	26.0	29.7*‡
Waist girth (cm)	81.9	80.7	88.1*‡
Waist-to-hip ratio	0.84*†	0.78‡	0.82
Truncal fat (by DXA, %)	31.4	30.5	33.6*‡
VAT (cm^3)	69.1*†	62.3	57.5
Subcutaneous fat (cm^3)	155.4	158.5	229.2*‡
Visceral-to-subcutaneous fat	0.49‡	0.42	0.36
Fasting glucose (mg/dL)	107.1*	101.5	97.1
2-hour glucose (mg/dL)	187.0*†	127.0	140.6
Fasting insulin (ng/mL)	0.45	0.48	0.44
2-hour insulin (ng/mL)	3.12	2.70	3.02
HOMA-IR	3.10	3.04	2.65
Type 2 diabetes (%)	32.1*†	5.8	12.1

* $p < 0.05$, Filipino vs. African American.
† $p < 0.05$, Filipino vs. white.
‡ $p < 0.05$ white vs. African American.

Statistical Analysis

Data were analyzed using SAS version 8.2 (SAS, Cary, NC). Student's t tests, ANOVA, general linear models, and χ^2 analysis were used for descriptive statistics. Pearson correlation coefficients were computed to assess the relationship between VAT and other anthropometric markers. Multivariable logistic regression was used to assess the relationship among ethnicity, VAT, and type 2 diabetes. Logistic regression models were constructed to compare diabetes risk among Filipinos vs. whites and Filipinos vs. African Americans, while adjusting for putative confounders including age, visceral adiposity, exercise, education, and alcohol intake. Multivariable regression was also performed separately for each ethnic group to assess the relationship between VAT and type 2 diabetes. A regression model that included ethnicity, VAT, and an ethnicity × VAT interaction term was also used to determine whether the relationship between VAT and type 2 diabetes differed by ethnicity. Statistical significance was designated at $p < 0.05$ and odds ratios (ORs) that excluded 1.

Results

A total of 181 Filipino, 193 African-American, and 196 white women 55 to 80 years old completed the clinical evaluation between 1995 and 1999 and had an EBCT scan in 2000 to 2002. As shown in Table 1, Filipinas were significantly younger than whites and African Americans ($p < 0.001$), but mean age did not differ between whites and African Americans ($p = 0.97$). Filipinas were more likely to be college graduates than whites ($p = 0.003$), but college attainment did not differ between Filipino and African-American women ($p = 0.13$), or between whites and African Americans ($p = 0.13$). Filipinas were less likely to have ever smoked cigarettes or to drink alcohol (≥three drinks per week) compared with whites ($p < 0.001$) or African Americans ($p < 0.001$). Smoking history was similar among whites and African Americans ($p = 0.96$), but African-American women were significantly less likely to drink alcohol compared with white women ($p < 0.001$). Exercise (≥three times per week) did not differ between Filipinas and whites ($p = 0.62$) or African Americans ($p =$

Table 2. Pearson correlation coefficients: CT-defined VAT and anthropometric markers among Filipino, African-American, and white women, 55- to 78-years-old, San Diego, 1995 to 2002

	Filipino (n = 181)	White (n = 196)	African American (n = 193)
BMI	0.417	0.687	0.503
Waist	0.593	0.768	0.556
Waist-to-hip ratio	0.432	0.602	0.297
Truncal fat (DXA)	0.408	0.490	0.476
Subcutaneous fat (CT)	0.212	0.609	0.590
Visceral-to-subcutaneous fat ratio	0.604	0.418	0.165

0.083). However, exercise was significantly less frequent among African Americans compared with whites (p = 0.02).

As shown in Table 1, African-American women had significantly larger age-adjusted BMI (29.7 kg/m^2), waist girth (88.1 cm), and truncal fat (33.6% by DXA) compared with Filipinas or whites ($p < 0.01$); however, VAT was lowest for African Americans (57.5 cm^3) and highest for Filipinas (69.1 cm^3, p = 0.0004). Waist circumference, BMI, and truncal fat did not differ between Filipino (81.9 cm, 25.5 kg/m^2, 31.4%) and white women (80.7 cm, 26.0 kg/m^2, 30.5%); however, Filipinas had significantly more VAT compared with white women (69.1 vs. 62.3 cm^3, p = 0.037). Although African Americans had significantly larger waist circumference, BMI, and truncal fat compared with whites, VAT did not differ between these two groups (p = 0.13). Waist-to-hip ratio was significantly lower for white women compared with Filipino or African-American women ($p < 0.0001$) and higher for Filipinas than African-American women (p = 0.001).

Subcutaneous fat was significantly higher among African-American women compared with Filipino or white women ($p < 0.001$) but did not differ between Filipinas and whites (p = 0.69). The ratio of visceral to subcutaneous fat was significantly higher among Filipinas compared with African Americans (p = 0.003) but did not differ between Filipinas and whites (p = 0.11) or between African Americans and whites (p = 0.16).

Filipino women had significantly higher age-adjusted fasting glucose levels compared with African-American women ($p < 0.004$), but fasting glucose levels did not differ between whites and Filipinas (p = 0.10) nor between whites and African Americans (p = 0.19). However, 2-hour postchallenge glucose levels were significantly higher among Filipinas compared with African Americans or whites ($p < 0.0001$) but did not differ between African-American and white women (p = 0.11). Age-adjusted fasting insulin, 2-hour postchallenge insulin, and HOMA-IR values did not differ by ethnicity.

Pearson correlation coefficients were computed to determine the relationship between VAT and anthropometric markers. VAT correlated positively with BMI, waist girth, waist-to-hip ratio, truncal fat (by DXA), subcutaneous fat, and visceral-to-subcutaneous fat ratio ($p < 0.02$). As shown in Table 2, Pearson correlation coefficients between VAT and BMI, waist, waist-to-hip ratio, truncal fat (by DXA), and subcutaneous fat were highest for whites. Correlation coefficients were highest for VAT and waist girth in each ethnic group; however, these values were higher in whites (r = 0.77) compared with Filipino (r = 0.59) or African-American (r = 0.56) women. VAT correlated reasonably well with BMI among whites, but correlation coefficients were lower among Filipino or African-American women.

Age-adjusted type 2 diabetes prevalence was 32.1% in Filipinas, 5.8% among whites, and 12.1% among African-American women. As shown in Figure 1, age-adjusted prevalence of type 2 diabetes was highest for Filipino women at every tertile of VAT. As expected, type 2 diabetes prevalence was higher for women in the highest VAT (≥74.9 cm^3) tertile: whites, 9.8%, African Americans, 14.7%; and Filipino women, 46.6%. However, among

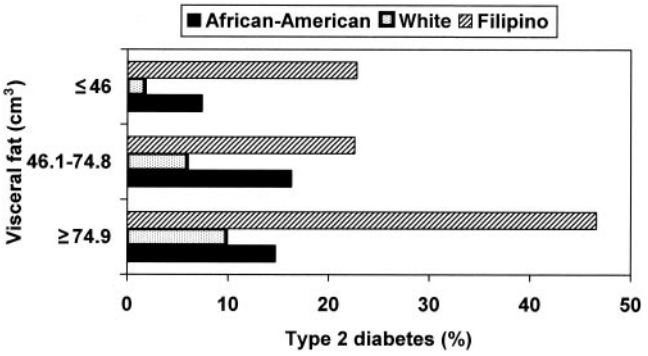


Figure 1: Age-adjusted type 2 diabetes prevalence, by VAT tertiles and ethnicity, 55- to 80-year-old women, San Diego, CA 1995 to 2002.

Table 3. VAT among normal-weight or normal-waist women, by WHO criteria, among Filipino, white, and African-American women

	Filipino	White	African American
Normal weight*			
VAT (cm^3)	53.8†‡	43.8	37.9
Type 2 diabetes	20.6%†‡	2.1%	7.5%
Normal waist§			
VAT (cm^3)	54.8	50.9	43.8†¶
Type 2 diabetes	23.3%	3.3%	10.4%

* Filipino, BMI < 23 kg/m^2; white and African American, BMI < 25 kg/m^2.
§ Filipino, waist <80 cm; white and African American, waist ≤88 cm.
† $p < 0.05$, Filipino vs. African American.
‡ $p < 0.05$, Filipino vs. white.
¶ $p < 0.05$, white vs. African American.

women with the least VAT (≤46 cm^3), type 2 diabetes was low (1.7%) among whites, 7.4% among African-American women, and as high as 22.8% among Filipino women ($p < 0.001$). Type 2 diabetes prevalence increased with increasing levels of VAT among whites but did not follow a linear trend among Filipino and African-American women.

Normal Weight and Waist Girth in Asians: WHO Criteria

WHO has recommended the use of lower BMI and waist cut-off points to define overweight and abdominal obesity among Asians (11). When these criteria were applied to define women with normal weight (Filipinas, BMI < 23 kg/m^2; whites and African Americans, <25 kg/m^2), as shown in Table 3, VAT was significantly higher among Filipinas (53.8 cm^3) compared with white (43.8 cm^3, $p = 0.031$) or African-American (37.9 cm^3, $p = 0.004$) women. Among these normal-weight women, diabetes prevalence remained significantly higher among Filipinas (20.6%) compared with whites (2.1%) or African Americans (7.5%).

Among women with normal-waist girth (Filipinas, ≤80 cm; whites and African Americans, ≤88 cm), VAT was significantly lower in African-American women but did not differ between Filipino and white women (Table 3). However, diabetes prevalence among these normal-waist women remained significantly higher for Filipinas (23.3%) compared with whites (3.3%) and African Americans (10.4%). As shown in Figure 2, VAT among normal-weight Filipinas was significantly higher at every level of waist girth compared with normal-weight white and African-American women ($p < 0.005$).

In multivariable analysis, compared with white women, Filipinas had a 7-fold higher risk of type 2 diabetes [adjusted OR, 7.51; 95% confidence interval (CI), 2.51 to 22.5], after adjusting for age, VAT, exercise, college education, and alcohol intake (Table 4). Similarly, compared with African-American women, Filipinas had a 2-fold

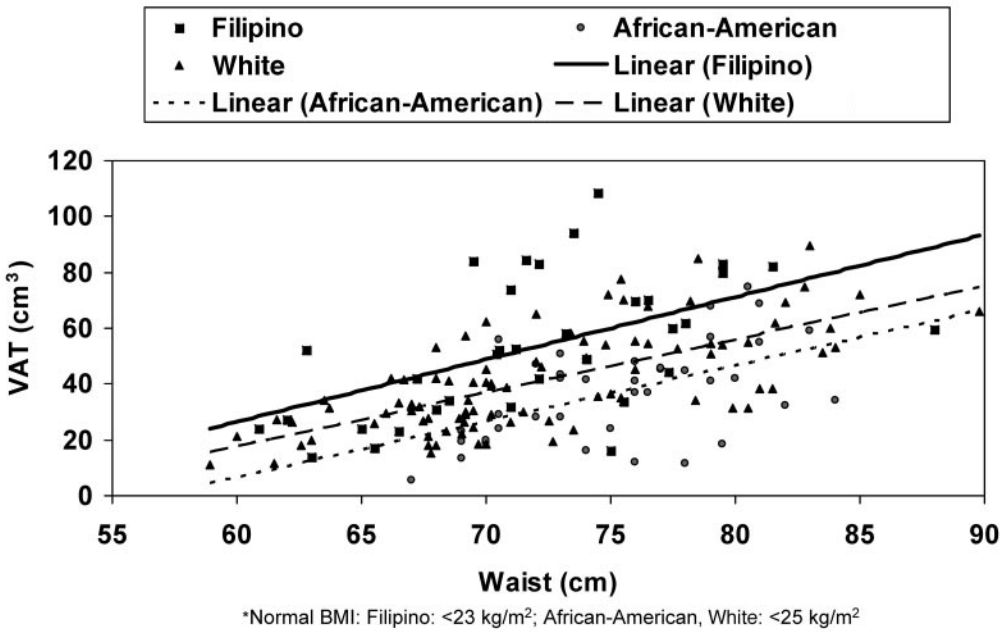


Figure 2: Visceral adipose tissue by waist girth in women with normal* BMI, by ethnicity.

Table 4. Multivariable analysis: covariates associated with type 2 diabetes: Filipino vs. white and African-American women

	White		African American	
Covariate	**OR**	**95% CI**	**OR**	**95% CI**
Age	1.04	0.81 to 1.35	1.04	0.83 to 1.31
Filipino	7.51	2.51 to 22.5	2.30	1.09 to 4.86
VAT	1.10	1.05 to 1.15	1.12	1.06 to 1.18
Exercise (≥3 times/wk)	1.10	0.57 to 2.12	1.76	0.92 to 3.39
College graduate	0.43	0.23 to 0.80	0.42	0.23 to 0.77
Alcohol (≥3 times/wk)	0.81	0.22 to 2.99	0.78	0.16 to 3.83

higher risk of type 2 diabetes (adjusted OR, 2.30; 95% CI, 1.09 to 4.86), after adjusting for age, VAT, exercise, college education, and alcohol intake. However, in multivariable analysis limited to white and African-American women, ethnicity was not associated with the risk of type 2 diabetes (adjusted OR, 2.47; 95% CI, 0.84 to 7.23); VAT was the only covariate associated with type 2 diabetes (adjusted OR, 1.10; 95% CI, 1.03 to 1.17) in a model that adjusted for age, exercise, education, and alcohol intake. VAT was independently associated with type 2 diabetes risk in all ethnic groups, but ethnic differences in VAT did not fully account for the elevated type 2 diabetes risk among Filipino women.

To determine whether the relationship of VAT to type 2 diabetes differed by ethnicity, an interaction term, ethnicity × VAT, was included in a multivariable regression model; however, the ethnicity × VAT interaction term was not associated with diabetes risk ($p = 0.861$), suggesting that the association between diabetes and visceral fat did not differ by ethnicity.

Discussion

This is the first study, to our knowledge, to report excess VAT accumulation and prevalence of type 2 diabetes among Filipino women with similar BMI, waist girth, and truncal fat as white women. These observations of excess VAT among Filipinas persisted after lower BMI and waist girth cut-off points for Asians were applied to define women with normal weight and normal waist circumference. Hence, WHO recommendations for lower cut-off points to define overweight and large waist girth among Asians inadequately identifies excess VAT among Filipino-American women. Excess VAT is a known risk factor for type 2 diabetes; however, excess VAT in Filipinas did not explain their excess risk for type 2 diabetes compared with white or African-American women.

This study supports other observations that BMI, waist-to-hip ratio, and waist circumference are not comparable across different racial and ethnic groups. Similar to previous observations, our cohort of African Americans had the largest BMI, waist girth, and truncal fat (by DXA) but had the least VAT (5,13). In our study, waist, BMI, waist-to-hip ratio, and truncal fat (by DXA) did not detect important ethnic differences in VAT demonstrated by CT. Similarly, African-American women defined as overweight by BMI (≥25 kg/m^2) or having large waist girth (>88 cm) had significantly lower VAT compared with white women with similar BMI and waist circumference. Furthermore, BMI and waist girth correlated well with VAT for whites, but correlation coefficients were lower for African-American and Filipino women. Previous studies have reported lower visceral adiposity in African Americans but higher VAT volume among Asian Indians and Japanese Americans compared with whites of similar BMI (14–16). These observations coupled with the data reported here challenge the sensitivity of BMI or waist circumference as estimates of VAT except among whites of Northern European ancestry.

The mechanism for ethnic disparities in VAT accumulation is unclear. Excess subcutaneous fat accumulation and decreased VAT deposition have been observed among individuals of African descent, whether resident in Africa, the U.S., the Caribbean, South America, or Europe, but the mechanism for such fat distribution has not been elucidated. Similarly, the mechanism behind preferential deposition of VAT in selected ethnic groups, including Asian Indians, Mexican Americans, and Filipinos, remains unclear (16).

Previous studies have shown an adverse association between physical inactivity and VAT accumulation; however, exercise frequency was similar among Filipino and white women. Furthermore, multivariable analysis showed that physical activity was associated with VAT among white and African-American women but not among Filipinas.

In a prospective study of non-diabetic Japanese-American men, greater IR and reduced insulin secretion preceded VAT accumulation (17). Our cross-sectional design did not allow us to distinguish whether VAT accumulation preceded or followed metabolic abnormalities; however, nei-

ther fasting insulin nor IR (by HOMA-IR) differed by ethnicity. Other studies have suggested that IR is associated with alterations in fatty acid metabolism, and circulating free fatty acids inhibit the ability of insulin to stimulate muscle glucose uptake and to suppress hepatic glucose production (18). Furthermore, visceral fat may not be as important as subcutaneous fat in supplying free fatty acids to the liver (19). However, subcutaneous fat was not associated with type 2 diabetes in our cohort.

Ethnic differences in VAT could account for some of the ethnic disparities in type 2 diabetes prevalence, particularly in populations where general obesity is uncommon. No ethnic differences were observed in diabetes risk between African-American and white women after adjusting for VAT, age, exercise, alcohol intake, and education. However, the risk of type 2 diabetes was 7 times higher among Filipinas compared with whites and twice as high compared with African-American women after adjusting for known diabetes risk factors. Excess VAT did not explain the elevated prevalence of type 2 diabetes in these Filipino-American women. Type 2 diabetes prevalence was 23% among Filipinas in the lowest tertile of VAT, compared with just 1.7% among whites.

Excess VAT accumulation may result in changes in the production or action of adipocytokines, including adiponectin, resistin, leptin, and tumor necrosis factor-α. Filipinos may have lower levels of adipose-derived hormones, including adiponectin, which plays an important role in glucose homeostasis and insulin sensitivity and has been shown in prospective studies (20–23) to be predictive of type 2 diabetes. Future studies should consider the etiologic relationship between adipocytokines and type 2 diabetes risk among Filipinos.

This study has several limitations. Obtaining a population-based sample of Filipino-Americans was not feasible when the study was initiated because 1990 census data reported Asian-American census collectively. However, our sample is representative of all Filipino women in the U.S. with regard to college attainment, which was used as a marker for socioeconomic status (24). Furthermore, African-American women were chosen to select for white-collar workers to minimize the effects of racial/ethnic differences in social class and access to health care that often confound studies of non-white women. The sample was limited to women without known cardiovascular disease or revascularization surgery in 2000 to 2002; consequently, women with longer duration of type 2 diabetes might have had more symptomatic CHD and would not have been represented. However, the proportion of women who were excluded from participating because of previously diagnosed cardiovascular disease did not differ by ethnicity (Filipinas 21%, white 23%) (9); therefore, participation bias resulting from differential diagnosis of prior CHD by ethnicity was unlikely.

In conclusion, Filipino women have excess VAT accumulation despite similar BMI and waist girth as white women. The risk of type 2 diabetes did not differ between African-American and white women after adjusting for VAT and other known risk factors; age-adjusted prevalence of type 2 diabetes was significantly higher in Filipinos than in white or African-American women; however, VAT did not explain the excess risk of type 2 diabetes among Filipino-American women. CT measurement of VAT volume is costly and inconvenient. Future studies should consider mechanisms mediating diabetes risk and methods to reduce VAT accumulation in ethnic groups that are not overweight even by Asian standards. Continued evaluation of fat depots other than VAT, including intermuscular adipose tissue, may enhance current knowledge regarding ethnic variations in fat accumulation and IR.

Acknowledgments

This work was supported by American Heart Association Grant 0070088Y, by NIH/National Institute of Diabetes and Digestive and Kidney Diseases Grant R03 DK60575, by NIH/National Institute on Aging Grant 5R01AG07181, and by NIH/National Institute of Diabetes and Digestive and Kidney Diseases Grant 5R01DK31801.

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Optimum BMI Cut Points to Screen Asian Americans for Type 2 Diabetes

Diabetes Care 2015;38:814–820 | DOI: 10.2337/dc14-2071

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OBJECTIVE

Asian Americans manifest type 2 diabetes at low BMI levels but may not undergo diagnostic testing for diabetes if the currently recommended BMI screening cut point of ≥25 kg/m^2 is followed. We aimed to ascertain an appropriate lower BMI cut point among Asian-American adults without a prior diabetes diagnosis.

RESEARCH DESIGN AND METHODS

We consolidated data from 1,663 participants, ages ≥45 years, without a prior diabetes diagnosis, from population- and community-based studies, including the Mediators of Atherosclerosis in South Asians Living in America study, the North Kohala Study, the Seattle Japanese American Community Diabetes Study, and the University of California San Diego Filipino Health Study. Clinical measures included a 2-h 75-g oral glucose tolerance test, BMI, and glycosylated hemoglobin (HbA_{1c}).

RESULTS

Mean age was 59.7 years, mean BMI was 25.4 kg/m^2, 58% were women, and type 2 diabetes prevalence (American Diabetes Association 2010 criteria) was 16.9%. At BMI ≥25 kg/m^2, sensitivity (63.7%), specificity (52.8%), and Youden index (0.16) values were low; limiting screening to BMI ≥25 kg/m^2 would miss 36% of Asian Americans with type 2 diabetes. For screening purposes, higher sensitivity is desirable to minimize missing cases, especially if the diagnostic test is relatively simple and inexpensive. At BMI ≥23 kg/m^2, sensitivity (84.7%) was high in the total sample and by sex and Asian-American subgroup and would miss only ∼15% of Asian Americans with diabetes.

CONCLUSIONS

The BMI cut point for identifying Asian Americans who should be screened for undiagnosed type 2 diabetes should be <25 kg/m^2, and ≥23 kg/m^2 may be the most practical.

The International Diabetes Federation recently reported that Southeast Asia and the Western Pacific region have over half (55%) of the world's 382 million diabetes cases (1). The World Health Organization estimates that by 2030, 7 of the 10 countries with the greatest burden of diabetes cases will be in Asia (2). Similar patterns are recognized in the U.S., where the Diabetes Study of Northern California (DISTANCE) showed that among 2 million members of a large integrated health care system, Pacific Islanders, Filipinos, and South Asians had the highest prevalence and incidence of type 2 diabetes, exceeding those of ethnic groups traditionally known to

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Received 29 August 2014 and accepted 11 January 2015.

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have elevated diabetes risk, including Native Americans, African Americans, and Latinos (3). However, diabetes prevalence and incidence were higher among Southeast Asians, Japanese, Vietnamese, Koreans, and Chinese compared with Caucasians, despite lower BMI (3).

Current American Diabetes Association (ADA) guidelines suggest that diabetes screening should be considered in asymptomatic adults who are overweight (BMI $\geq$25 kg/m^2) and have one or more known risk factors for diabetes, including Asian ethnicity (4). If these risk factors are absent, testing should begin at age 45 years. Lower BMI cut points have been considered to define obesity among Asians (5), but it is not known whether this may also apply to Asian Americans, whose lifestyle behaviors, particularly dietary choices, differ from those of residents of Asia. Previous studies have reported lower BMI among Asian Americans with diabetes; however, they differed in study design, enrollment criteria, and method and time of diabetes ascertainment (6). Recent studies among Asians in Canada and the U.K. have defined BMI cutoff values among Chinese and South Asians that correspond to the equivalent incidence and prevalence of diabetes at a BMI of 30 kg/m^2 in whites (7,8). However, few studies have evaluated BMI cut points for type 2 diabetes screening among Asian Americans using sensitivity, specificity, and receiver operating characteristic (ROC) curve analysis.

The objective of this analysis was to ascertain the BMI cut point that might be most practical for identifying Asian adults ($\geq$45 years) who were found to have previously undiagnosed type 2 diabetes in four clinical cohort studies in the U.S.

RESEARCH DESIGN AND METHODS

We used cross-sectional data from 1,663 Asian Americans enrolled in four different U.S. cohort studies, ages $\geq$45 years, without a prior diabetes diagnosis. Participants were of South Asian, Filipino, Japanese, Chinese, Korean, or mixed Asian ancestry, without non-Asian admixture. The four studies that contributed data included the Mediators of Atherosclerosis in South Asians Living in America (MASALA) study, the North Kohala Study, the Seattle Japanese American Community Diabetes Study (JACDS), and the University of California San Diego (UCSD) Filipino Health Study. These studies were selected because they are clinical studies of multiple health outcomes, thereby reducing self-selection of individuals with diabetes. Further, each of these studies administered a 2-h 75-g oral glucose tolerance test (OGTT), measured weight and height concomitantly, and ascertained whether there was a prior diabetes diagnosis. Glycosylated hemoglobin (HbA_{1c}) was measured by high-performance liquid chromatography using an automated analyzer in all cohorts except the Seattle JACDS and Filipino men in San Diego.

UCSD Filipino Health Study

Between 1995 and 1999, 453 Filipino-American women were enrolled as an ethnic comparison group to the Rancho Bernardo Study. Between 2006 and 2007, 109 Filipino-American men were enrolled using the same research protocol and clinic staff. Population-based sampling was not feasible because Filipinos were not disaggregated from other Asian subgroups in the 1990 census, and random digit dialing by last name was impractical because of shared Spanish surnames between Filipinos and San Diego's sizeable Mexican-American population. Community volunteers were recruited at churches, stores, and festivals and through local Filipino media and organizations. Demographic characteristics of participants, particularly with regard to educational attainment, were similar to U.S. census data for Filipina women. Recruitment materials emphasized general health and included tests for osteoporosis and other conditions to reduce self-selection bias for participants with known diabetes (9). Enrollment criteria included age $\geq$40 years, self-reported Filipina, and plans to reside in San Diego for the subsequent 5 years for follow-up.

North Kohala Study

Between 1997 and 2000, a population-based study was conducted among 1,452 nonpregnant residents, ages 18 years and older, in North Kohala, a rural community on the island of Hawaii. Participants were identified by door-to-door census and a cross-reference directory, and community support for the research project was fostered through local public television announcements, flyers posted at community centers and stores, and presentations given to community organizations (10). Participants completed a 4-h clinical examination and interview, including self-reports of ethnic ancestry.

MASALA Study

Between 2010 and 2013, 906 South Asian men and women were enrolled at two clinical centers (the University of California, San Francisco, San Francisco, CA, and Northwestern University, Chicago, IL). Eligibility criteria, recruitment, and study methods have been described previously (11). Sampling was performed using South Asian last name samples from commercial mailing list companies at each site. To be eligible, participants had to self-report South Asian ethnicity, be between 40 and 84 years of age, and be able to speak and/or read English, Hindi, or Urdu. Individuals with any known cardiovascular disease (CVD) or history of cardiovascular procedures were excluded from this study (11).

Seattle JACDS

This study included only individuals of pure Japanese ancestry residing in King County, WA, who were Nisei (second-generation children of immigrants from Japan) or Sansei (third-generation children of the Nisei). Recruitment began in 1983 with a volunteer sample of Nisei men (n = 229). The study sample was expanded in 1986 to include Nisei women (n = 191) and Sansei men (n = 120) and women (n = 118) (12–14). Nisei participants were selected to oversample self-reported diabetic individuals in order to compare diabetic with nondiabetic individuals. Although the study participants were volunteers, they were shown to be very similar in terms of several demographic characteristics to the overall Japanese-American population of King County (12,13). Baseline examinations were carried out from 1983 to 1986 for Nisei men, from 1986 to 1988 for Nisei women, and from 1988 to 1991 for all Sansei.

Demographic characteristics obtained from all studies included age, sex, self-reported ethnicity and admixture, and medical history, including prior diagnosis of type 2 diabetes by a physician. Self-reported ethnicity was ascertained through multiple questions including the following: participant's province and country of birth, parents' birthplace, and participant's description of their race/ethnicity (UCSD Filipino Health Study); an estimate of the participant's percentage ancestry for each of eight of the most common

ethnic groups in Hawaii and which ethnic group they strongly identify with (North Kohala Study); if at least three grandparents were born in a South Asian country and the participant's province/state and country of birth (MASALA); and if both parents and all four grandparents were Japanese (Seattle JACDS).

Clinical measures included height using a standardized stadiometer and weight by standard balance beam or digital scale, with participants wearing lightweight clothing and no shoes. BMI was computed as weight divided by height squared in metric units. A 2-h 75-g OGTT was administered after a minimum 8-h fast. HbA_{1c} was measured except among Filipino men in San Diego and Japanese men and women in Seattle. Plasma glucose was measured by the glucose oxidase method and HbA_{1c} by high-performance liquid chromatography.

Type 2 diabetes was defined by ADA criteria (2010) as HbA_{1c} ≥6.5% (48 mmol/mol), fasting plasma glucose (FPG) ≥126 mg/dL (6.99 mmol/L), or 2-h post–75-g glucose challenge glucose (PPG) ≥200 mg/dL (11.1 mmol/L) (4).

Statistical Analysis

Descriptive analyses were performed and presented as percentages or means (and SD values) for categorical and continuous covariates, respectively. Mean values of continuous covariates were compared using independent Student *t* tests or ANOVA in unadjusted comparisons and general linear models in age-adjusted comparisons. Pearson χ^2 test was used for categorical variables. All *P* values were two sided, with $P < 0.05$ considered statistically significant. Age-adjusted prevalence was computed by the direct method.

Sensitivity, specificity, and positive predictive values were computed at 1-unit increments of BMI, ranging from 22 to 27.5 kg/m^2. This BMI range was selected to include BMI values recommended by the World Health Organization to define overweight (23 kg/m^2) and obesity (27.5 kg/m^2) among Asians (5). At each BMI cut point, sensitivity was calculated as the proportion with type 2 diabetes and a BMI value equal to or greater than the BMI cut point among all individuals with type 2 diabetes; specificity was the proportion without type 2 diabetes and a BMI lower than the specific BMI cut point among all individuals without type 2 diabetes; and positive predictive value was computed as the proportion with type 2 diabetes and a BMI equal to or greater than the BMI cut point. Area under the receiver operating characteristic curve (AUROC) for logistic regression models was computed using the c statistic. Statistical analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC).

Optimal BMI cut points were evaluated using several criteria, including *1*) Youden index (sensitivity + specificity − 1); *2*) misclassification rate (false-negative + false-positive rate); *3*) the BMI cut point where sensitivity approximated specificity; and *4*) where sensitivity approximated 80%. BMI cut points were evaluated for the total sample, by sex, and by Asian-American subgroup.

RESULTS

Participants included 536 Filipinos (421 from the UCSD Filipino Health Study and 115 from the North Kohala Study), 500 Japanese (371 from Seattle JACDS and 129 from North Kohala), 609 South Asians from the MASALA study, and 18 of Chinese, Korean, or mixed East Asian ancestry (from the North Kohala Study). Collectively, 58% were women, and whereas sex was evenly divided among Japanese and South Asians, three-fourths of Filipinos were women (Table 1). Mean age was 59.7 years (SD 9.2), ranging from 45 to 95 years, with South Asians being

Table 1—Age-adjusted demographic and clinical characteristics: Filipinos, Japanese, and South Asians in the U.S., aged ≥45 years

	Filipino, San Diego and Hawaii, *n* = 536	Japanese, Hawaii and Seattle, *n* = 500	South Asian, San Francisco and Chicago, *n* = 609
Men (*n*)	121	254	311
Women (*n*)	415	246	298
Mean age (years)	61.3‡ (9.5)	61.3† (9.1)	56.9 (8.3)
Men	68.1*,‡ (8.4)	61.0† (9.0)	58.0 (9.0)
Women	59.3‡ (8.9)	61.6*,† (9.1)	55.7 (7.4)
Mean BMI (kg/m^2)	25.5* (3.8)	24.9 (3.6)	25.8† (4.5)
Men	26.6 (3.8)	25.7 (3.2)	25.7 (4.6)
Women	25.3* (3.8)	23.8 (3.6)	26.0†,‡ (4.4)
Mean waist (cm)	84.1*,‡ (11.3)	88.2† (9.9)	92.5 (10.0)
Men	93.3* (10.3)	90.1 (9.2)	95.4† (9.0)
Women	81.7 (10.2)	86.4* (10.2)	89.0†,‡ (9.9)
Fasting glucose (mg/dL) (mmol/L)	101.6‡ (20.2) 5.65 (1.12)	101.0† (19.5) 5.62 (1.08)	98.8 (19.0) 5.46 (1.00)
2-h glucose (mg/dL) (mmol/L)	157.6*,‡ (65.7) 8.79 (3.64)	148.7† (53.5) 8.31 (2.97)	139.3 (53.2) 7.64 (2.95)
HbA_{1c} (%)	5.68* (0.99)	4.85 (0.82)	5.88† (0.55)
HbA_{1c} (mmol/mol)	39 (10.8)	29 (9.0)	41 (6.0)
Age-adjusted diabetes prevalence (%)			
Diabetes, ADA 2010	22.8*,‡	12.9	13.0
By HbA_{1c} ≥6.5% (≥48 mmol/mol)	12.2*,‡	4.2	6.8
By FPG ≥126 mg/dL (≥6.99 mmol/L)	5.4	4.8	3.9
By 2-h PPG ≥200 mg/dL (≥11.1 mmol/L)	19.4*,‡	11.9	11.0

Data are mean (SD) unless otherwise indicated. Eighteen participants of Chinese, Korean, or mixed East Asian ancestry are not represented. There were no HbA_{1c} data for San Diego Filipino men and Seattle Japanese. *$P < 0.05$, Filipino vs. Japanese. †$P < 0.05$, Japanese vs. South Asian. ‡$P < 0.05$, Filipino vs. South Asian.

slightly younger compared with either Filipinos or Japanese ($P < 0.05$). Mean BMI was 25.4 kg/m^2 (SD 4.0, range 14.6–67.1 kg/m^2). Average BMI was similar by ethnicity among men but was significantly lower among Japanese women compared with either Filipinos or South Asian women and was significantly lower among Filipino women compared with South Asian women.

Collectively, mean FPG was 5.58 mmol/L (100.5 mg/dL, SD 19.3) and was significantly lower among South Asians compared with Filipinos or Japanese. Mean PPG was 8.22 mmol/L (148.1 mg/dL, SD 58.3) and was significantly higher among Filipinos compared with the other two groups and significantly higher among Japanese compared with South Asians. HbA_{1c} was not measured among Japanese in Seattle or Filipino men in San Diego. Mean HbA_{1c} was 5.69% (SD 0.84) (39 mmol/mol, SD 9.2) and was significantly higher among South Asians compared with either group and significantly higher among Filipinos compared with Japanese.

A total of 1,663 participants had FPG and PPG measures; of these, only 1,214 (73%) had HbA_{1c} measures. Using any of these criteria, cumulative diabetes prevalence was 16.9% in the sample of 1,663 adults. When stratified by Asian-American subgroup, age-adjusted newly diagnosed type 2 diabetes prevalence was significantly higher among Filipinos (22.8%) compared with either Japanese (12.9%) or South Asians (13.0%) ($P < 0.001$) and did not differ between Japanese and South Asians ($P = 0.78$). These observations persisted when diabetes was diagnosed by either HbA_{1c} or PPG but did not differ by Asian-American subgroup when diabetes was defined by FPG only. When stratified by diagnosis method, 112 (9.2%) had $HbA_{1c} \geq 6.5\%$ (48 mmol/mol), 83 (5.0%) had FPG $\geq$126 mg/dL (6.99 mmol/L), and 244 (14.7%) had PPG $\geq$200 mg/dL (11.1 mmol/L).

Among the 1,214 participants with all three diagnostic measures, type 2 diabetes prevalence was 18.4% ($n = 223$). Of these, 9.2% ($n = 112$) fulfilled the HbA_{1c} criterion, 5.5% ($n = 67$) met the FPG criterion, and 15.5% ($n = 188$) met the PPG criterion. If screening was limited to HbA_{1c}, half (50%) of Asian Americans with diabetes would remain undiagnosed. If FPG was added, an additional, albeit minimal ($n = 14$), 1.2% would be diagnosed. The remaining 44% ($n = 97$) of Asian Americans with type 2 diabetes would remain undiagnosed without the PPG since they had isolated postchallenge hyperglycemia (with both HbA_{1c} and FPG not diagnostic of diabetes).

The area under the BMI-diabetes ROC curve was 0.617. This low AUROC value reflects the poor sensitivity of BMI in predicting type 2 diabetes in an Asian-American population. Among the 281 participants without a prior diagnosis of type 2 diabetes, BMI at the time of diagnosis is shown in Fig. 1. Although the mean BMI at the time of diabetes diagnosis was 26.7 kg/m^2, 37% of women and 21% of men with diabetes had a BMI $\leq$24.9 kg/m^2 and may otherwise not be screened if the recommended threshold criterion for screening of BMI $\geq$25 kg/m^2 is used.

Table 2 shows the sensitivity, specificity, positive predictive value, and misclassification rate in the total sample and by sex. Sensitivity varied widely, ranging from 90.8 to 36%; however, the misclassification rate was similar across BMI cut points, ranging from 0.87 at BMI $\geq$23 kg/m^2 to 0.83 at BMI $\geq$27 kg/m^2. The positive predictive value was low across all BMI cut points, ranging from 19.5% at BMI $\geq$23 kg/m^2 to 25% at BMI $\geq$27 kg/m^2. The BMI cut point with the highest Youden index and the lowest misclassification rate was 26 kg/m^2; however, limiting screening at this cut point would miss almost half (48.4%) of Asian Americans with previously undiagnosed diabetes. The BMI cut point where sensitivity approximated specificity was 25.2 kg/m^2, but limiting screening to this cut point would miss 39.5% of Asian Americans with previously undiagnosed type 2 diabetes.

Figure 2 shows sensitivity values by Asian-American subgroup at each BMI cut point. Sensitivity declined with increasing BMI and varied widely, although Youden index values varied minimally across BMI cut points. At a BMI $\geq$23 kg/m^2, sensitivity was 89.8% for Filipinos, 84.2% among South Asians, and 79.1% for Japanese. Sensitivity declined with a higher cut point at BMI $\geq$25 kg/m^2, ranging from 62.7% among Filipinos, to 65.7% in Japanese, to 67.1% among South Asians. Limiting screening to this BMI cut point would miss diabetes diagnosis in 37% of Filipinos, 34% of Japanese, and 33% of South Asians.

Youden index values were low, and misclassification rates were high, and values were relatively similar across BMI cut points, thereby limiting their usefulness in identification of optimal BMI cut points. Therefore, to reduce missing potential cases of type 2 diabetes, a targeted sensitivity of 80% was used as a final criterion to assess optimal BMI cut points for identifying Asian Americans who should undergo diabetes screening. In the total sample, as well as for men and women, a BMI cut point of $\geq$23.5 kg/m^2 produced sensitivity approximating 80% (Fig. 2).

When stratified by subgroup, BMI cut points of 23.6 kg/m^2 among Filipinos, 23.4 kg/m^2 among South Asians, and 22.8 kg/m^2 among Japanese Americans

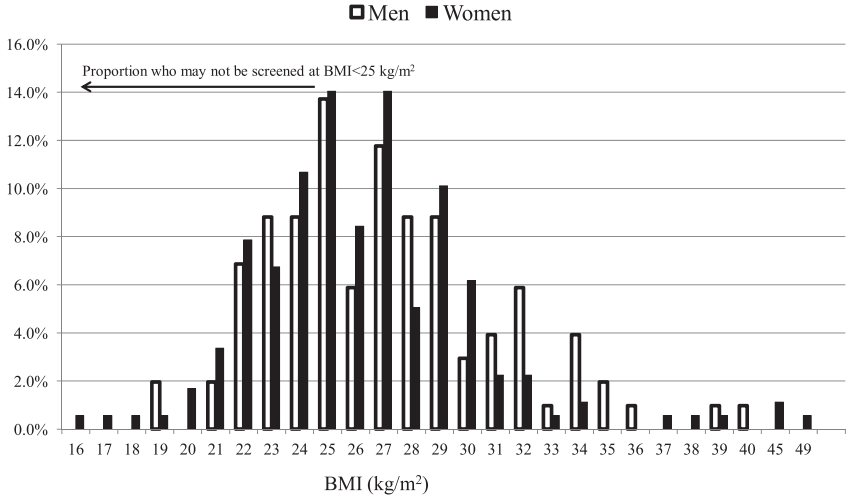


Figure 1—Percent distribution of Asian Americans with newly diagnosed type 2 diabetes by BMI.

Table 2—Sensitivity, specificity, positive predictive value, and AUROC among Asian-American adults, aged ≥45 years, without known type 2 diabetes

BMI (kg/m^2)	Diabetes (*n* [%])	Sensitivity (%)	Specificity (%)	PPV (%)	Misclassification rate
Total	*N* = 1,663				
≥22	255 (15.3)	90.8	18.4	15.3	0.91
≥23	238 (14.3)	84.7	28.8	19.5	0.87
≥24	208 (12.5)	74.0	40.7	20.3	0.85
≥25	179 (10.8)	63.7	52.8	21.5	0.84
≥26	145 (8.7)	51.6	65.3	23.2	0.83
≥27	122 (7.3)	43.4	73.6	25.1	0.83
≥27.5	102 (6.1)	36.3	77.8	24.9	0.86
Women	*n* = 970				
≥22	159 (16.4)	89.3	22.4	20.5	0.88
≥23	150 (15.5)	84.3	33.2	22.1	0.83
≥24	131 (13.5)	73.6	45.8	23.4	0.81
≥25	112 (11.6)	62.9	57.1	24.8	0.80
≥26	90 (9.3)	50.6	68.4	26.5	0.81
≥27	74 (7.6)	41.6	76.1	28.1	0.82
≥27.5	60 (6.2)	33.7	79.4	26.9	0.87
Men	*n* = 693				
≥22	96 (13.9)	93.2	13.1	15.8	0.94
≥23	88 (12.7)	85.4	22.9	16.2	0.92
≥24	77 (11.1)	74.8	33.9	16.5	0.91
≥25	67 (9.7)	65.1	47.1	17.7	0.88
≥26	55 (7.9)	53.4	61.0	19.3	0.86
≥27	48 (6.9)	46.6	70.2	21.4	0.83
≥27.5	42 (6.1)	40.8	75.6	22.6	0.84

PPV, positive predictive value.

yielded sensitivity values approximating 80%. When stratified by diabetes diagnostic criteria, sensitivity approached 80% at BMI ≥24.0 kg/m^2 among participants diagnosed by HbA_{1c} ≥6.5% (48 mmol/mol), at BMI ≥23.4 kg/m^2 among those diagnosed by FPG ≥126 mg/dL (6.99 mmol/L), and at BMI ≥23.2 kg/m^2 among Asian Americans with isolated postchallenge hyperglycemia.

The identification of a BMI cut point that has higher sensitivity would be economically and clinically practical to identify Asian Americans who should undergo diabetes screening.

Screening Asian Americans at BMI ≥23 kg/m^2 had a sensitivity of 84.7% and would miss identification of ∼15.3% of Asian Americans with type 2 diabetes. Further, screening Asian Americans at BMI ≥23 kg/m^2 might facilitate identification of Asian Americans with isolated postchallenge hyperglycemia. When analyses included younger participants, BMI ≥23 kg/m^2 persisted as the optimal cut point for those aged ≥35 years (*n* = 2,042) or ≥40 years (data not shown).

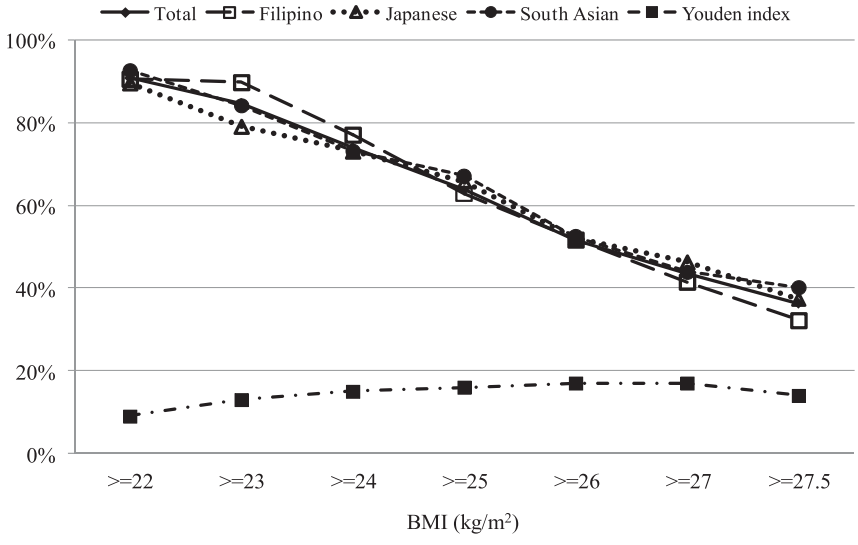


Figure 2—Sensitivity and Youden index at selected BMI cut points.

CONCLUSIONS

In the absence of a national, multicenter, prospective cohort study of Asian Americans, our combined data from our four community-based studies showed that age-adjusted diabetes prevalence (16.9%) by OGTT was high among Asian-American adults without a prior diabetes diagnosis. However, limiting screening to HbA_{1c} and fasting glucose measures fails to identify almost half of Asian Americans with type 2 diabetes. Current recommendations to screen asymptomatic Americans with BMI ≥25 kg/m^2 produced low sensitivity and specificity and would fail to identify over one-third of Asian Americans with type 2 diabetes. Diabetes screening at a lower BMI cut point of ≥23 kg/m^2 should be considered since it improves sensitivity and would enable early diagnosis and management of Asian Americans with type 2 diabetes. BMI alone cannot predict incident diabetes, but our data suggest that a BMI cut point of ≥23 kg/m^2 can be a practical initial screening tool to identify Asian Americans who may have or be at risk for diabetes. The U.S. Preventive Services Task Force recently changed its position to broaden screening for diabetes and prediabetes, supporting a wider BMI approach to screening. BMI serves as a trigger point for action (15).

There is now ample evidence that diabetes is present among Asian Americans at a higher frequency than in the non-Hispanic white population. Since the costs associated with type 2 diabetes are mainly attributable to the management and consequences of complications associated with this disease and since these complications are related to both duration and severity of hyperglycemia, it is important to identify individuals who may be at increased risk for diabetes to institute therapy in a timely manner. Rates of diabetes-related complications have reduced significantly in the past two decades (16), and this may be due to improved glucose control.

Increased body size as manifested by greater body weight and BMI has been

recognized to identify people who are at risk for diabetes. However, many Asian Americans who have documented type 2 diabetes do not appear to be very heavy (6). Excess visceral fat accumulation, assessed by computed tomography, was observed among Filipino Americans (even with BMI $<$23 kg/m^2) compared with normal-weight Caucasians and African Americans (17). Temporal change in intra-abdominal fat area, independent of BMI, was predictive of incident diabetes among Japanese Americans with normal BMI (24.2 kg/m^2) (18). Thus in clinical practice, Asian Americans are likely to be overlooked as being at risk for type 2 diabetes by BMI cutoff criteria for overweight and obesity that are more useful for non-Asian populations. Our findings support the view that a lower BMI cut point is appropriate for identifying Asian Americans who should be screened for undiagnosed type 2 diabetes, and our proposed BMI cut point of 23 kg/m^2 is within the range of other observations among Asian British and Asian Canadians. For the equivalent prevalence of diabetes at 30 kg/m^2 in white participants, BMI equated to 22 kg/m^2 among South Asians in the UK Biobank study (7) and to 24 kg/m^2 among South Asians in Canada (8). Both studies had a sizeable number of Chinese participants but no Japanese or Filipino participants, so comparisons to our findings were not feasible for these Asian subgroups.

Both studies identified different BMI cut points for Chinese and South Asians, ranging from 25 to 26 kg/m^2 and 22 to 24 kg/m^2, respectively. Asian Americans are heterogeneous with regard to diabetes prevalence and risk, but identifying and implementing BMI cut points for each Asian subgroup is impractical. A single BMI cut point from a public health standpoint that is simple to use is critical as we continue to face a high rate of undiagnosed diabetes in the U.S., while appreciating the need for an individualized approach on the patient level according to other risk factors, including ethnicity.

Clinical and diagnostic tests are characterized by both sensitivity and specificity. There are multiple criteria for defining optimum cut points for such testing, and these vary by disease as well as the cost and convenience of the test. Generally speaking, for diagnosis of a disease, specificity is highly desirable. For screening, however, it is preferable to be more inclusive rather than exclusive to minimize overlooking at-risk cases. This is particularly the case if the screening test is not costly and definitive diagnosis of the disease for which screening is being conducted is also economical. The costs associated with determining BMI are negligible, and the costs of the diagnostic test for type 2 diabetes are reasonable. The cost of performing an OGTT involves a glucose solution and test administration after 2 h and is suitably higher than that of an FPG test.

BMI is a useful first-step screening test for the identification of patients at risk for diabetes. A BMI cut point that has higher sensitivity despite lower specificity would be economically and clinically practical to identify Asian Americans who should undergo further glucose testing for type 2 diabetes. Based upon our examination of the extant literature and the data from the current analysis, we have examined the criteria for defining the BMI cutoff value based upon sensitivity and suggest that BMI $\geq$23 kg/m^2 may be appropriate. Although reduction in this cutoff will lead to more people being tested and found to be without diabetes, there may be value in this determination to those tested in reassuring them of the absence of this common metabolic disease.

Screening guidelines should also consider the value of the OGTT, particularly among Asian Americans. Limiting screening to just HbA_{1c} and FPG failed to identify 44% of Asian Americans with type 2 diabetes, specifically those with isolated postchallenge hyperglycemia. Isolated impaired glucose tolerance and postchallenge hyperglycemia are common features among South Asians, Japanese, and Filipinos (19–21), reflecting normal to slightly reduced hepatic insulin sensitivity, moderate to severe muscle insulin resistance, and a severe deficit in late-phase insulin secretion (22). Such differences in the pathophysiology of type 2 diabetes among Asians compared with other ethnic groups reinforce the importance of the 2-h OGTT for early diagnosis of type 2 diabetes among Asian Americans.

The strengths of the current analysis include data obtained from population-based or community health studies where participants were recruited for general health outcomes. The North Kohala Study was population based and included young residents, ages 20 years and older. The MASALA study was population based and used telephone recruitment based on last name lists and excluded participants with CVD, thereby possibly reducing self-selection of participants with CVD comorbidities, including type 2 diabetes. In San Diego, recruitment materials emphasized multiple health outcomes, including osteoporosis, to reduce self-selection of participants with CVD or type 2 diabetes. The Japanese cohort in Seattle was based on a volunteer sample that was representative of Japanese Americans in Seattle (23). All four studies queried participants about their medical history and current medication, and the current analysis excluded those with a physician diagnosis of type 2 diabetes, as well as those taking insulin or oral hypoglycemic agents. The few existing studies on diabetes prevalence among Asian Americans have been based on self-report, medical records, HbA_{1c}, or FPG, such that individuals with isolated postchallenge hyperglycemia are missed (20). In our analysis, diabetes ascertainment was complete since it was based on OGTT in all 1,663 participants. Further, diabetes was ascertained by all three methods, including HbA_{1c} and fasting and postchallenge glucose, in 1,214 participants. Finally, to our knowledge, this is the first analysis to assess sensitivity, specificity, positive predictive value, and misclassification rates at every BMI cut point in pooled samples of Asian-American study populations.

Several study limitations require acknowledgment, particularly the absence of available data from Chinese, Vietnamese, and Korean cohorts in the U.S. Our sample was limited to just 18 Chinese, Korean, and mixed-Asian participants in the North Kohala Study, which was population based. Chinese migration to the U.S. began over a century ago, and Chinese Americans comprise the largest Asian-American subgroup. Vietnamese and Koreans comprise the fourth and fifth largest Asian-American subgroups, respectively, exceeding the Japanese-American population. However, there are no clinical cohorts of these Asian-American subgroups that include OGTT measures. Data from the DISTANCE study showed that Chinese Americans with either incident or prevalent diabetes

had lower BMI compared with Filipinos and South Asians (3); therefore, our observation of an optimal BMI screening cut point of $\geq$23 kg/m^2 might also be appropriate for Americans of Chinese descent. Our collective sample size was small compared with the DISTANCE and UK Biobank studies; however, to our knowledge, our data represent all population- and community-based clinical cohorts of Asian Americans where diabetes was ascertained by OGTT. Prospective studies among aggregate Asian-American subgroups must be established to better understand the unique pathophysiology of diabetes among Asian Americans and establish appropriate screening, prevention, and treatment interventions.

Acknowledgments. The authors thank the study participants for their time and commitment, and their clinical research teams. The Veterans Affairs Puget Sound Health Care System supported both S.E.K.'s and E.J.B.'s involvement in this article.

Funding. This work was supported by the National Institutes of Health (DK-31801, R03-DK-60575, HL-093009, K24-HL-112827, DK-31170, DK-02654, DK-02860, DK-48152, DK-50703, DK-55460, DK-17047, DK-55460, DK-35876, HL-07028, HL-49293, RR-00037, HL-29393, U01-HL-079163, and G12-RR-03061) and the Department of Veterans Affairs.

Duality of Interest. No potential conflicts of interest relevant to this article were reported.

Author Contributions. M.R.G.A. conceived the project, collected data, conducted statistical analysis, and wrote the manuscript. A.M.K. and W.Y.F. collected and contributed data to this project, assisted with statistical interpretation of the results, helped draft sections of the manuscript, and reviewed and edited the manuscript. W.C.H. assisted with statistical interpretation of the results, helped draft sections of the manuscript, and reviewed and edited the manuscript. H.K.C. conceived the project and collected data and reviewed and edited the manuscript. A.G. collected data, prepared data files, contributed to the interpretation of the results, and reviewed and edited the manuscript. E.J.B. and T.H. collected and contributed data to this project, assisted with statistical interpretation of the results, and reviewed and edited the manuscript. S.E.K. collected and contributed data to this project and reviewed and edited the manuscript. D.L.L. and M.J.M. collected and contributed data to this project. Y.O. and K.K.S. reviewed and edited the manuscript. M.R.G.A. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Prior Presentation. Excerpts of this study (San Diego and Hawaii data) were presented as an oral presentation (OR-71) and all data from this article were presented as a late-breaking poster (161-LR) at the 74th Scientific Sessions of the American Diabetes Association, San Francisco, CA, 13–17 June 2014.

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Obesity and Overweight in American Indian and Alaska Native Children, 2006–2015

Ann Bullock, MD, Karen Sheff, MS, Kelly Moore, MD, and Spero Manson, PhD

Objectives. To estimate obesity and overweight prevalence in American Indian and Alaska Native (AI/AN) children across genders, ages, and geographic regions in the Indian Health Service active clinical population.

Methods. We obtained data from the Indian Health Service National Data Warehouse. At least 184 000 AI/AN children aged 2 to 19 years had body mass index data for each year studied, 2006 to 2015. We calculated body mass index percentiles with the 2000 Centers for Disease Control and Prevention growth charts.

Results. In 2015, the prevalence of overweight and obesity in AI/AN children aged 2 to 19 years was 18.5% and 29.7%, respectively. Boys had higher obesity prevalence than girls (31.5% vs 27.9%). Children aged 12 to 19 years had a higher prevalence of overweight and obesity than younger children. The AI/AN children in our study had a higher prevalence of obesity than US children overall in the National Health and Nutrition Examination Survey. Results for 2006 through 2014 were similar.

Conclusions. The prevalence of overweight and obesity among AI/AN children in this population may have stabilized, while remaining higher than prevalence for US children overall. (*Am J Public Health.* 2017;107:1502–1507. doi:10.2105/AJPH.2017.303904)

Obesity has emerged as a marker of serious health risk for our nation's children. Childhood obesity is associated with increased risk for later development of type 2 diabetes and other chronic diseases such as hypertension, coronary heart disease, and some forms of cancer.[1,2] Obesity also increases the risk for social and emotional morbidity for children and adolescents.[1] Furthermore, childhood obesity tends to persist into adulthood.[1,2]

According to previous studies, American Indian children experience higher prevalence of obesity and related health conditions, such as type 2 diabetes, compared with US children as a whole.[1,3–8] However, previous estimates of obesity among American Indian/Alaska Native (AI/AN) children have relied upon limited regional studies, often with small sample sizes.[1] The extent and severity of obesity among AI/AN children and youths have not been examined nationally.

Childhood obesity among low-income preschool-aged children in the United States may be decreasing, as indicated by Pediatric Nutrition Surveillance System data in several states[9] and in nationally representative data of children aged 2 to 5 years from the National Health and Nutrition Examination Survey (NHANES) from 2003–2004 to 2013–2014.[10] However, the latest studies drawing upon nationally representative data from NHANES have demonstrated no significant changes in childhood obesity prevalence for children aged 2 to 19 years in recent years, from 2005–2006 to 2013–2014.[10,11] These findings suggest that overall childhood obesity prevalence may be plateauing, but is not decreasing.

To determine if similar trends are occurring in AI/AN children, we examined the prevalence of childhood obesity and overweight in the Indian Health Service (IHS) active clinical population in each year from 2006 to 2015. In addition, we estimated prevalence by age, sex, and geographic region.

METHODS

We used data collected each fiscal year (October 1 to September 30) from 2006 to 2015 at federally funded health care facilities that serve AI/AN people across all 12 IHS administrative areas. The facilities include federally operated IHS hospitals and clinics, as well as facilities operated directly by tribal governments through contracts or compacts with the IHS. We also included urban Indian health organizations that provide services to AI/AN people residing in 34 metropolitan areas. Together, these health care facilities serve about 2.2 million AI/AN people who belong to 567 federally recognized tribes in 36 states.

We obtained the data from the IHS National Data Warehouse (NDW), a central repository of registration and encounter-based patient data from IHS, tribal, and urban (I/T/U) Indian health facilities.[12–15] As patients can receive services at multiple facilities, which submit data separately to the NDW, we identified unique patients according to the IHS standard unduplication process, which employs a probabilistic matching strategy to assign a unique identifier to each individual patient.[15] This process allows patient information in the NDW to be linked across facilities within a fiscal year; however, it does

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This article was accepted May 6, 2017.

doi: 10.2105/AJPH.2017.303904

not allow for data for individual patients to be linked across years.[13] As such, the data were treated as cross-sectional, with each year treated independently of the others. This approach should result in conservative estimates of variability and confidence interval limits.[16]

Patients aged 2 to 19 years in the I/T/U clinical population with at least 1 outpatient primary care encounter for the relevant fiscal year were eligible to be included. We defined primary care encounters on the basis of clinic type and included general, pediatric, and family practice. Patients also had to be identified by sex and as AI/AN in the NDW. Data were available for AI/AN children from all 12 IHS administrative areas, and the distribution of AI/AN children across areas was similar to the overall distribution of AI/AN people of all ages across the areas.

Outcome Variable

We selected the most recent values of height and weight measured during the same outpatient encounter in each fiscal year for each eligible patient. We calculated body mass index (BMI) as weight in kilograms divided by height in meters squared, with age- and sex-specific BMI percentiles determined by using the 2000 Centers for Disease Control and Prevention (CDC) growth charts.[17] Approximately one third of eligible patients in each fiscal year did not have any values for height and weight or did not have values for both during the same encounter. We excluded children if their BMI value was identified as being biologically implausible (extremely low or high), according to CDC definitions.[18]

We defined overweight and obesity on the basis of BMI percentiles. Overweight is presented in 2 different ways. First, we assigned children to distinct categories of overweight versus obesity, with overweight defined as BMI greater than or equal to the 85th and less than 95th percentile for age and sex (definition 2) and obesity as BMI greater than or equal to the 95th percentile for age and sex.[19] Second, to facilitate comparisons with other recent studies, overweight is also defined as BMI greater than or equal to the 85th percentile (definition 1).

We defined class 2 obesity as BMI greater than or equal to 120% of the 95th percentile or BMI greater than or equal to 35, whichever is lower based on age and sex. We operationalized class 3 obesity as BMI greater than or equal to 140% of the 95th percentile or BMI greater than or equal to 40, whichever is lower based on age and sex.[20]

Other Variables

Other demographic variables obtained through the NDW included date of birth and sex. We calculated age as months of age at the time of selected height and weight for calculating BMI and converted to years of age by dividing by 12 and using the integer part of the result (e.g., we analyzed 10 years and 0 days to 10 years and 364 days as age of 10 years). We divided patients into age groups of 2 to 5, 6 to 11, and 12 to 19 years, consistent with other publications of obesity data on US children.

Because obesity prevalence varies regionally, we also examined trends by the following geographic regions: Alaska, California, Northwest, Southwest subregion 1, Southwest subregion 2, Southern Plains, Northern Plains, Great Lakes, and East (Figure A, available as a supplement to the online version of this article at http://www.ajph.org). We created these geographic regions by renaming or combining IHS areas to preserve anonymity of specific tribes.

Statistical Analysis

The data analyses for this study were undertaken with SAS/BASE and SAS/STAT software, version 9.4 of the SAS System for Windows (2002–2012, SAS Institute Inc, Cary, NC).

We calculated descriptive statistics and confidence intervals, but we performed no statistical comparisons as there was substantial overlap in the children included over the fiscal years and no way to easily identify children from year to year. We adjusted analyses for clustering of patients within geographic areas by using survey analysis procedures in SAS.

RESULTS

At least 184 000 AI/AN children aged 2 to 19 years had BMI data for each year studied, 2006 to 2015. Results are presented for 2015 alone along with trends for 2006 through 2015.

Overweight and Obesity Prevalence in 2015

For 2015, 206 834 AI/AN children aged 2 to 19 years had BMI data in the NDW that met the criteria described in Methods and were included in the analysis. Table 1 summarizes overweight and obesity prevalence by age, sex, and region for 2015.

Overall, in AI/AN children aged 2 to 19 years, the prevalence of overweight (definition 2: BMI ≥ 85th but < 95th percentile) was 18.5% and obesity was 29.7%. Children aged 2 to 5 years were the smallest group, 26.3% of children included, and had the lowest prevalence of overweight (17.5%), obesity (20.7%), and classes 2 and 3 obesity (4.3% and 1.0%, respectively). Those aged 12 to 19 years represented the majority of children included, 40.6%, and had the highest prevalence of overweight (19.7%), obesity (33.8%), and classes 2 and 3 obesity (16.1% and 6.3%, respectively). In the middle age group, 6 to 11 years, prevalence was between the younger and older age groups for all BMI categories, with 17.9% overweight, 31.7% obese, 13.0% class 2 obese, and 4.4% class 3 obese.

Obesity and overweight in AI/AN children varied by year of age, with the highest obesity prevalence observed at 11 years of age (Figure 1). The distributions of children with BMI less than the 85th percentile and those with obesity underwent reciprocal changes with increasing age, while overweight remained relatively unchanged.

Slightly more girls than boys were included in the analysis, 51.1% versus 48.9%. Whereas girls had a higher prevalence of overweight, 20.2%, versus 16.8% for boys, boys had higher prevalence of obesity than girls, 31.5%, versus 27.9%. Boys also had higher prevalence of classes 2 and 3 obesity than girls, 13.0% versus 11.0% and 4.7% versus 3.9%, respectively.

Among geographic regions, the Southern Plains had the lowest prevalence of both overweight (17.1%) and obesity (26.0%, equal to Alaska), respectively. The highest prevalence of overweight was seen in Alaska (20.8%), and the highest prevalence of obesity was seen in Southwest subregion 2 (35.9%).

TABLE 1—Distribution of Demographic Characteristics and Obesity in American Indian and Alaska Native Children: Fiscal Year 2015, United States

Characteristic	Full Sample, No. (%)	Overweight Definition 1,[a] % (95% CI)	Overweight Definition 2,[b] % (95% CI)	Obesity,[c] % (95% CI)	Class 2 Obesity,[d] % (95% CI)	Class 3 Obesity,[e] % (95% CI)
Total no.	206 834	99 729	38 352	61 377	24 794	8854
Total prevalence		48.2 (47.6, 48.9)	18.5 (18.3, 18.8)	29.7 (29.1, 30.3)	12.0 (11.7, 12.3)	4.3 (4.1, 4.5)
Age, y						
2–5	54 380 (26.3)	38.3 (37.4, 39.2)	17.5 (17.1, 17.9)	20.7 (20.1, 21.4)	4.3 (4.1, 4.5)	1.0 (0.9, 1.1)
6–11	68 547 (33.1)	49.6 (48.8, 50.4)	17.9 (17.6, 18.2)	31.7 (30.9, 32.4)	13.0 (12.5, 13.5)	4.4 (4.1, 4.6)
12–19	83 907 (40.6)	53.5 (52.8, 54.2)	19.7 (19.4, 20.0)	33.8 (33.2, 34.5)	16.1 (15.7, 16.6)	6.3 (6.0, 6.6)
Sex						
Female	105 723 (51.1)	48.1 (47.4, 48.8)	20.2 (19.9, 20.5)	27.9 (27.3, 28.5)	11.0 (10.7, 11.4)	3.9 (3.7, 4.1)
Male	101 111 (48.9)	48.3 (47.6, 49.0)	16.8 (16.5, 17.0)	31.5 (30.9, 32.2)	13.0 (12.6, 13.4)	4.7 (4.5, 4.9)
IHS region						
Alaska	11 159 (5.4)	46.8 (44.6, 49.1)	20.8 (19.9, 21.7)	26.0 (24.2, 27.8)	8.9 (8.0, 9.8)	3.1 (2.7, 3.4)
California	12 745 (6.2)	47.9 (46.5, 49.3)	18.3 (17.6, 19.1)	29.6 (28.4, 30.8)	12.5 (11.7, 13.3)	4.7 (4.1, 5.3)
Northwest	11 628 (5.6)	52.3 (50.5, 54.2)	20.3 (19.5, 21.1)	32.0 (30.4, 33.6)	12.5 (11.6, 13.5)	4.4 (3.9, 4.9)
Southwest subregion 1	40 905 (19.8)	46.5 (45.5, 47.5)	18.6 (18.1, 19.0)	27.9 (27.1, 28.8)	10.1 (9.6, 10.6)	3.1 (2.8, 3.3)
Southwest subregion 2	31 007 (15.0)	54.4 (52.9, 56.0)	18.6 (18.1, 19.1)	35.9 (34.3, 37.4)	15.6 (14.5, 16.7)	5.9 (5.2, 6.7)
Southern Plains	48 534 (23.5)	43.2 (42.1, 44.3)	17.1 (16.8, 17.5)	26.0 (25.1, 26.9)	10.9 (10.4, 11.5)	3.9 (3.7, 4.2)
Northern Plains	33 953 (16.4)	48.4 (47.0, 49.8)	18.6 (18.2, 19.1)	29.8 (28.6, 31.0)	11.9 (11.2, 12.6)	4.4 (4.0, 4.8)
Great Lakes	9 839 (4.8)	53.5 (50.4, 56.6)	19.9 (19.1, 20.7)	33.6 (30.9, 36.3)	13.9 (12.5, 15.4)	5.3 (4.5, 6.1)
East	7 064 (3.4)	53.3 (51.1, 55.5)	19.4 (18.6, 20.2)	33.9 (32.0, 35.9)	14.7 (13.7, 15.7)	5.4 (4.8, 6.1)

Note. CI = confidence interval; IHS = Indian Health Service.

[a]Overweight definition 1: body mass index (BMI, kg/m^2) ≥ 85th percentile.

[b]Overweight definition 2: BMI ≥ 85th but < 95th percentile.

[c]Obesity: BMI ≥ 95th percentile, includes class 2 and class 3 obesity.

[d]Class 2 obesity: BMI ≥ 120% of the 95th percentile or 35, includes class 3 obesity.

[e]Class 3 obesity: BMI ≥ 140% of the 95th percentile or 40.

For class 2 obesity prevalence, Alaska was lowest (8.9%), and for class 3 obesity, Alaska and Southwest subregion 1 tied for lowest at 3.1%. Southwest subregion 2 was highest for both class 2 and 3 obesity (15.6% and 5.9%).

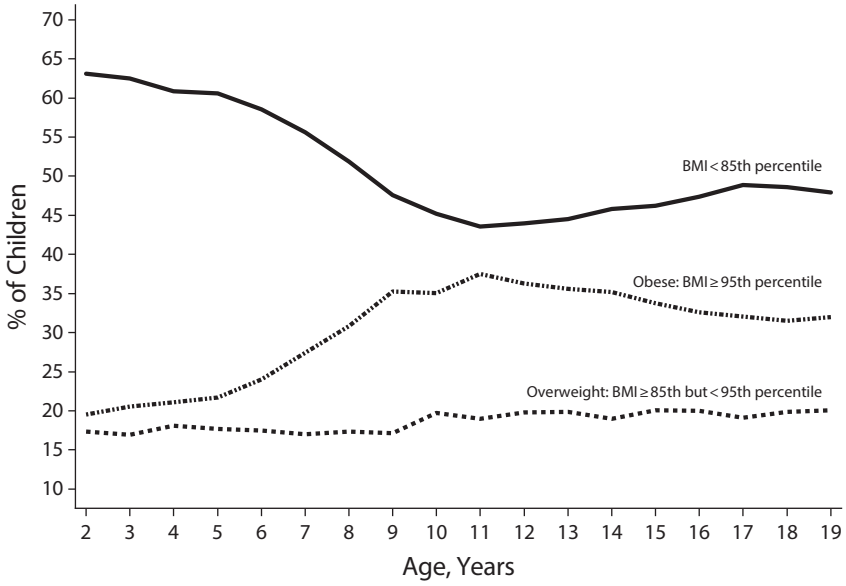
Overweight and Obesity Trends

Figure 2 and Table A (available as a supplement to the online version of this article at http://www.ajph.org) present the prevalence of overweight (definition 2: BMI ≥ 85th but < 95th percentile) and obesity for AI/AN children overall by fiscal year from 2006 to 2015. In 2006, among all children aged 2 to 19 years, 19.5% were overweight and 28.9% were obese. The prevalence of overweight decreased slightly over the years to 18.5% in 2015, while obesity prevalence increased slightly to 29.7%, although the estimates for both were relatively stable. Figure 2 displays this stable linear trend over all years of the study. For both classes 2 and 3 obesity, prevalence increased slightly from 2006 to 2015, 11.0% to 12.0% for class 2 and 3.9% to 4.3% for class 3.

Table A (available as a supplement to the online version of this article at http://www.ajph.org) also provides prevalence estimates of overweight and obesity by age group, along with Figure 3. Children aged 12 to 19 years had the highest prevalence of overweight for all years of the study and obesity from 2011 to 2015, with those aged 6 to 11 years having higher obesity prevalence in some previous years. In children aged 2 to 5 years, there was a decrease in prevalence of overweight from 19.3% in 2006 to 17.5% in 2015. Overweight prevalence in the other 2 age groups was relatively stable: 18.6% in 2006 to 17.9% in 2015 for children aged 6 to 11 years and 20.2% in 2006 to 19.7% in 2015 for children aged 12 to 19 years. Children aged 2 to 5 years had the lowest prevalence of obesity for all years and a consistent decrease from 23.2% in 2010 to 20.7% in 2015. Among children aged 6 to 11 years, obesity prevalence was relatively steady across all years of the study (31.5% in 2006 and 31.7% in 2015), whereas we saw a slight increase in obesity in children aged 12 to 19 years, from 31.3% in 2006 to 33.8% in 2015.

There was an increase in both classes of severe obesity for children aged 12 to 19 years, with class 2 rising from 14.2% in 2006 to 16.1% in 2015 and class 3 rising from 5.4% in 2006 to 6.3% in 2015. Prevalence of both classes of severe obesity among the younger age groups was lower than for those aged 12 to 19 years, and there was little change from 2006 to 2015.

Prevalence of overweight and obesity by geographic region was stable over all years of the study, with only small changes from year to year (data not shown).



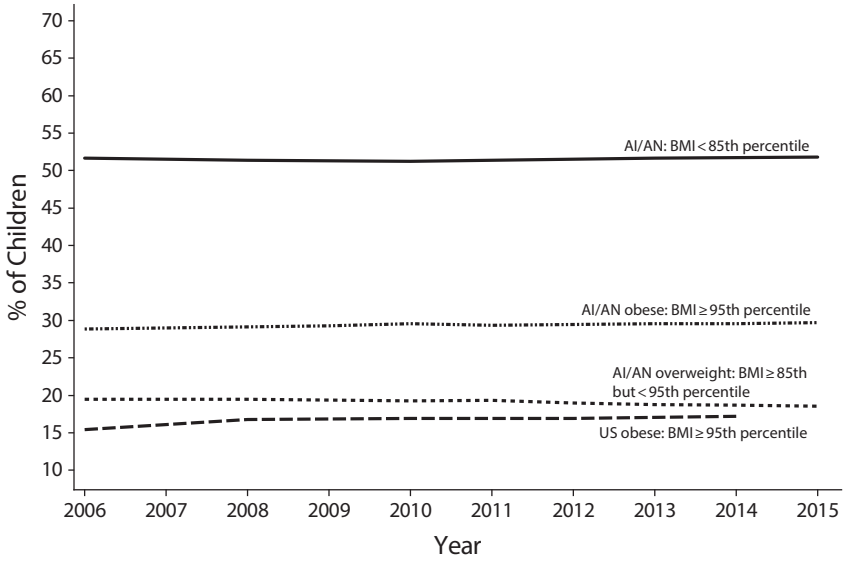
Note. BMI = body mass index (defined as weight in kilograms divided by the square of height in meters).

FIGURE 1—Body Mass Index Category for American Indian and Alaska Native Children by Year of Age for Fiscal Year 2015, United States

DISCUSSION

We found that AI/AN children aged 2 to 19 years in this population consistently had a higher estimated prevalence of obesity than US children the same age included in NHANES (Figure 2). This finding is consistent with previous regional and tribal-specific studies.[1,6] Although obesity prevalence was higher for AI/AN children than US children overall, we observed similar trends over time in prevalence of overweight and obesity in both groups.

The decrease in obesity prevalence we observed among AI/AN children aged 2 to 5 years from 2006 to 2015 is consistent with findings reported in national studies of children the same age. In particular, decreases in obesity prevalence have recently been reported among low-income preschool-aged children in 18 states between 2008 and 2011[9] according to data from the Pediatric Nutrition Surveillance System and among children aged 2 to 5 years in NHANES between 2003 and 2014.[10]



Notes. AI/AN = American Indian and Alaska Native; BMI = body mass index (kg/m^2).

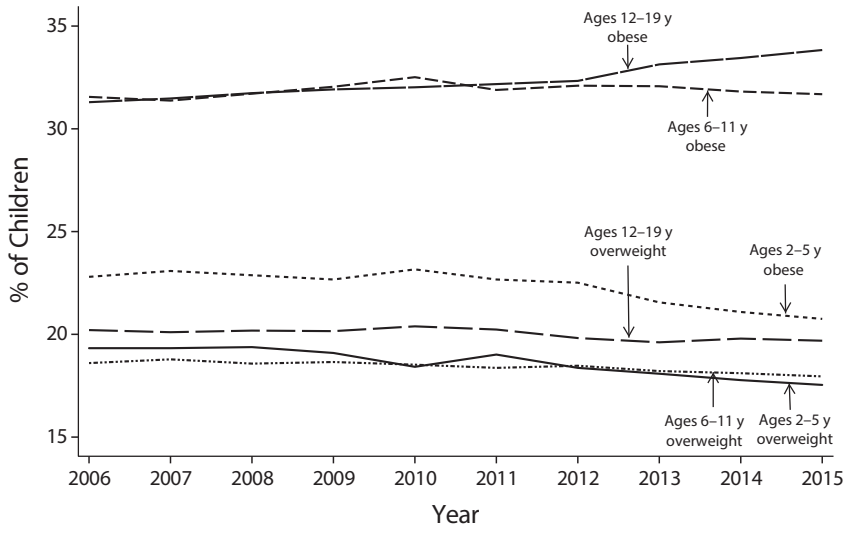
FIGURE 2—Body Mass Index Categories Among American Indian and Alaska Native Children Aged 2 to 19 Years and US Obesity: 2006–2015

For school-aged children, the patterns we observed in AI/AN children were also similar to those in published studies for the general US population of children. In particular, analysis of data from NHANES showed no significant change in obesity prevalence between 2007–2008 and 2013–2014 for those aged 6 to 11 years, whereas a significant increase was seen for those aged 12 to 19 years between 1988–1994 and 2013–2014.[10]

As with total obesity, our estimates of severe obesity prevalence for AI/AN children were higher than those for US children overall. In particular, class 2 obesity prevalence among AI/AN children aged 2 to 19 years was nearly double the most recent estimate of US prevalence from NHANES reported by Skinner et al.[11] (11.7% for AI/AN children in 2014 vs 6.2% for US children in 2013–2014). In our study, the prevalence of class 2 and 3 obesity increased slightly from 2006 to 2015. Similarly, Skinner et al. found significant increases in class 2 and 3 obesity among children in the United States from 1999 to 2014.[11] Continued examination of class 2 and 3 obesity is warranted across all populations.

We found that AI/AN children have higher prevalence of obesity (BMI ≥ 95th percentile) than overweight (BMI ≥ 85th percentile but < 95th percentile), unlike US children overall, for whom studies have shown higher prevalence of overweight than obesity or similar prevalence for both.[11,21]

There are several issues to consider when one is comparing the results of this study to those for US children overall from NHANES and the Pediatric Nutrition Surveillance System. All 3 are based on direct measurement of children's height and weight and use the same methods for calculating BMI and determining BMI percentiles. NHANES includes a nationally representative sample of children, but does not include sufficient numbers of AI/AN children to calculate valid



Note. The y-axis range is smaller than in Figures 1 and 2.

FIGURE 3—Prevalence of Overweight and Obesity Among American Indian and Alaska Native Children Aged 2 to 19 Years by Fiscal Year and Age Group: 2006–2015, United States

estimates of BMI for this population. The Pediatric Nutrition Surveillance System includes a large number of children, including AI/AN children, but only those aged 2 to 4 years from low-income families who attend federally funded maternal and child health and nutrition programs. Our analysis is based on the largest number of AI/AN children reported in any study of childhood obesity and includes children of all ages from across the country. However, as our data only include AI/AN children in the IHS active clinical population, the results should not be generalized beyond the study population.

Disparities in Obesity Prevalence

The reasons for the higher obesity prevalence in AI/AN children, a relatively new phenomenon seen only in the past few generations,[1,6] are not completely understood. Explanations often suggested include the fairly rapid transition from physically active subsistence and cultivation activities to a wage economy and sedentary lifestyles as traditional land bases have disappeared. Also, studies among Pima Indians have shown that in utero exposure to diabetes may mediate later obesity in the offspring through fetal adaptation to the hyperglycemic intrauterine environment.[22]

However, in light of recent research on the effects of stress and inadequate nutrition in utero and during early childhood on later obesity risk, the etiologies of obesity in AI/AN children almost certainly include the social determinants of health, particularly poverty. In the 2011 to 2013 American Community Survey, 29.2% of single-race AI/AN people were living in poverty in 2013, the highest rate of any racial group.[23] Social injustice, trauma, stress, forced cultural change, and displacement leading to cultural disintegration have been cited as key contributors to obesity and other chronic illnesses among AI/AN people.[24,25] In general populations, childhood trauma and stress have been shown to be linked to obesity and other chronic illnesses in adulthood.[26,27] Indeed, many AI/AN people live in social and physical environments that place them at higher risk than many other US persons for exposure to traumatic events.[25] Among children in a National Institute of Child Health and Human Development study, the experience of numerous negative life events in childhood increased risk for overweight by age 15 years.[28] Another contributing factor to obesity in children living in lower-income households is food insecurity, which is the lack of dependable access to sufficient quantities of high-quality foods.[29] Even before birth, stress and inadequate nutrition during pregnancy alter metabolic programming, increasing the risk for later obesity in the offspring.[30]

Classifying Childhood Overweight and Obesity

We used 2 definitions of childhood overweight in this study. One defined overweight inclusive of obesity (BMI ≥ 85th percentile for age and sex), which is used in other major studies[10,11]; the other distinguished between overweight and obesity (overweight = BMI ≥ 85th and < 95th percentile for age and sex). The latter definition was recommended by an Expert Committee in December 2007.[31] Figure B (available as a supplement to the online version of this article at http://www.ajph.org) shows how AI/AN children fit into discrete BMI categories in fiscal year 2015, including overweight, obesity, and severe obesity. We think it is valuable to use an approach that assigns each child to a single BMI classification and recommend consistency in reporting to allow comparisons across studies.

Strengths and Limitations

The strengths of our study are sample size, which is substantially larger than any previous study of obesity in AI/AN children, and representation from tribes throughout the United States. In addition, these data are drawn from primary care visits for children that generally visit I/T/U facilities and are not limited to children at high risk for obesity or other medical conditions. Other studies have shown that data from electronic health records generate highly stable population estimates of BMI and obesity prevalence that are compatible with NHANES results.[32]

Our study has several limitations that need to be considered. Most importantly, the results cannot be generalized to all AI/AN children in the United States because there is a substantial but unknown number who do not receive care from I/T/U facilities and thus are not represented in the NDW. For fiscal year 2015, our analysis included 206 834 AI/AN children, whereas the US Census reports that there were approximately 1.97 million AI/AN children (AI/AN alone or in combination with other races) in the United States in 2013.[33] However, as data on race are self-reported, many children counted by the Census as AI/AN may not meet the eligibility criteria to receive services at I/T/U facilities. In addition, some children who are eligible do not access services at these facilities.

Second, approximately one third of eligible patients in each fiscal year did not have any values for height and weight or did not have values for both during the same encounter. We excluded these children from all analyses, and it is unknown whether they are different from the included children in any way.

Third, this study is cross-sectional for each year and does not track children over time. As such, we are unable to evaluate the trajectory of BMI in AI/AN children as they age.

Finally, we performed no statistical tests as there was substantial overlap in the children included over the fiscal years and no way to link their data from year to year.

Conclusion and Public Health Implications

Obesity prevalence among AI/AN children in the IHS active clinical population is still high and higher than the general US population of children in NHANES. However, our data suggest that the overall prevalence of obesity among AI/AN children in this population may have stabilized in recent years.

To address the persistent disparity of higher obesity prevalence in AI/AN children, public health policy interventions aimed at childhood obesity should be inclusive of and culturally sensitive to AI/AN populations. AJPH

CONTRIBUTORS

All authors conceptualized and designed the study, and edited and critically revised the article. K. Moore conducted literature reviews. A. Bullock and K. Sheff drafted the initial article. K. Sheff analyzed the data.

ACKNOWLEDGMENTS

K. Moore and S. Manson are supported by the Centers for American Indian and Alaska Native Health of the School of Public Health, University of Colorado Denver. K. Moore was funded by the Indian Health Service (HHSI236201300002C). S. Manson is funded by the National Institute of Diabetes, Digestive, and Kidney Diseases (1P30DK092923) and the Indian Health Service (HHSI242200400049C).

We would like to acknowledge Larry Layne, PhD, from the Indian Health Service Division of Epidemiology and Disease Prevention for his assistance with extracting data from the Indian Health Service National Data Warehouse and for preparing the map in Figure A (available as a supplement to the online version of this article at http://www.ajph.org).

HUMAN PARTICIPANT PROTECTION

The Indian Health Service determined this project to constitute public health practice and not research; therefore, no formal institutional review board approvals were required.

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JAMA | Original Investigation

Differences in Obesity Prevalence by Demographic Characteristics and Urbanization Level Among Adults in the United States, 2013-2016

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IMPORTANCE Differences in obesity by sex, age group, race and Hispanic origin among US adults have been reported, but differences by urbanization level have been less studied.

OBJECTIVES To provide estimates of obesity by demographic characteristics and urbanization level and to examine trends in obesity prevalence by urbanization level.

DESIGN, SETTING, AND PARTICIPANTS Serial cross-sectional analysis of measured height and weight among adults aged 20 years or older in the 2001-2016 National Health and Nutrition Examination Survey, a nationally representative survey of the civilian, noninstitutionalized US population.

EXPOSURES Sex, age group, race and Hispanic origin, education level, smoking status, and urbanization level as assessed by metropolitan statistical areas (MSAs; large: ≥1 million population).

MAIN OUTCOMES AND MEASURES Prevalence of obesity (body mass index [BMI] ≥30) and severe obesity (BMI ≥40) by subgroups in 2013-2016 and trends by urbanization level between 2001-2004 and 2013-2016.

RESULTS Complete data on weight, height, and urbanization level were available for 10 792 adults (mean age, 48 years; 51% female [weighted]). During 2013-2016, 38.9% (95% CI, 37.0% to 40.7%) of US adults had obesity and 7.6% (95% CI, 6.8% to 8.6%) had severe obesity. Men living in medium or small MSAs had a higher age-adjusted prevalence of obesity compared with men living in large MSAs (42.4% vs 31.8%, respectively; adjusted difference, 9.8 percentage points [95% CI, 5.1 to 14.5 percentage points]); however, the age-adjusted prevalence among men living in non-MSAs was not significantly different compared with men living in large MSAs (38.9% vs 31.8%, respectively; adjusted difference, 4.8 percentage points [95% CI, −2.9 to 12.6 percentage points]). The age-adjusted prevalence of obesity was higher among women living in medium or small MSAs compared with women living in large MSAs (42.5% vs 38.1%, respectively; adjusted difference, 4.3 percentage points [95% CI, 0.2 to 8.5 percentage points]) and among women living in non-MSAs compared with women living in large MSAs (47.2% vs 38.1%, respectively; adjusted difference, 4.7 percentage points [95% CI, 0.2 to 9.3 percentage points]). Similar patterns were seen for severe obesity except that the difference between men living in large MSAs compared with non-MSAs was significant. The age-adjusted prevalence of obesity and severe obesity also varied significantly by age group, race and Hispanic origin, and education level, and these patterns of variation were often different by sex. Between 2001-2004 and 2013-2016, the age-adjusted prevalence of obesity and severe obesity significantly increased among all adults at all urbanization levels.

CONCLUSIONS AND RELEVANCE In this nationally representative survey of adults in the United States, the age-adjusted prevalence of obesity and severe obesity in 2013-2016 varied by level of urbanization, with significantly greater prevalence of obesity and severe obesity among adults living in nonmetropolitan statistical areas compared with adults living in large metropolitan statistical areas.

JAMA. 2018;319(23):2419-2429. doi:10.1001/jama.2018.7270

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Supplemental content

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Previous reports have shown differences in the prevalence of obesity among adults in the United States by sex, age group, and race and Hispanic origin. In 2011-2014, non-Hispanic black women had a higher prevalence of obesity than non-Hispanic white and Hispanic women, whereas Hispanic men had a higher prevalence than non-Hispanic white men, but the prevalence among non-Hispanic black men was not significantly different from non-Hispanic white men. Non-Hispanic Asian adults had the lowest prevalence of obesity among both men and women.[1]

Differences in obesity trends by other demographic characteristics also have been reported. From 2005 to 2014, the prevalence of obesity among women increased from 35% to 40% and severe obesity increased from 7% to 10%, whereas among men, the prevalence of obesity increased from 33% to 35% and severe obesity increased from 4.2% to 5.5%, but the changes were not statistically significant.[2]

Differences in the prevalence of chronic disease risk factors have been reported among adults living in rural areas compared with those living in urban areas.[3-6] These studies, using both measured and self-reported weight and height, have found a higher prevalence of obesity among adults living in rural areas compared with urban areas of the United States. It is unclear whether these differences have changed over time.

The objectives of this analysis were to provide the latest 4-year estimates (2013-2016) for the prevalence of obesity among US adults by sex, age group, race and Hispanic origin, education level, smoking status, and urbanization level. Among adults with obesity, those with severe obesity have even higher risks of obesity-related adverse health outcomes such as coronary heart disease[7] and end-stage renal disease[8]; therefore, prevalence estimates for severe obesity also were examined. Trends in the prevalence of obesity among adults have been previously reported by sex, age group, race and Hispanic origin, and education level[2,9,10]; using measured height and weight, this report adds trends by urbanization level from 2001 to 2016.

Key Points

Question During 2013-2016, were there differences in the prevalence of obesity and severe obesity by demographics and urbanization level among US adults?

Findings In this cross-sectional analysis that included 10 792 adults aged 20 years or older, differences were found in the prevalence of obesity and severe obesity by age group, race and Hispanic origin, and education level. The prevalence of obesity was significantly greater among women living in nonmetropolitan statistical areas (non-MSAs; 47.2%) compared with women living in large MSAs (38.1%), and the prevalence of severe obesity in non-MSAs was higher than in large MSAs among men (9.9% vs 4.1%, respectively) and women (13.5% vs 8.1%, respectively).

Meaning Differences in age group, race and Hispanic origin, education level, or smoking status were not related to the differences in the prevalence of obesity and severe obesity by urbanization level.

Methods

The National Health and Nutrition Examination Survey (NHANES) is a cross-sectional survey designed to monitor the health and nutritional status of the US population and has been conducted continuously since 1999. Data are released in 2-year cycles, with the most recent release for 2015-2016. Each NHANES cycle uses a stratified, multistage probability sampling design to produce a nationally representative sample of the US civilian, noninstitutionalized population.[11]

NHANES was approved by the National Center for Health Statistics (NCHS) research ethics review board. Adult participants provided written consent. The NHANES examination response rate for adults aged 20 years or older was 64% in 2013-2014 and 55% in 2015-2016; response rates for adults between 2001-2002 and 2011-2012 ranged between 65% and 73%.[12]

NHANES consisted of interviews conducted in participants' homes and physical examinations conducted in mobile examination centers, in which height and weight were measured using standardized techniques.[13] Body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) was rounded to 1 decimal place. Obesity was defined as a BMI of 30 or greater and severe obesity was defined as a BMI of 40 or greater according to clinical guidelines.[14]

Demographic variables included sex, age group, race and Hispanic origin, and education level because previous analyses have shown differences in the prevalence of obesity by these factors.[2,9,10] Participant age was categorized in the following age groups: 20 to 39 years, 40 to 59 years, and 60 years or older.

Participants' self-reported race and Hispanic origin was categorized as non-Hispanic white, non-Hispanic black, non-Hispanic Asian, Hispanic, or other (including multiple races). Data for the "other" category were included in the analyses of the entire population but the results for this category are not reported. Adjusted trend analyses between 2001-2002 and 2015-2016 included race and Hispanic origin categorized as non-Hispanic white, non-Hispanic black, Mexican American, or other due to NHANES sample design changes and for consistency across time.[11] The term *race and Hispanic origin* reflects the specific designation in NHANES.

Participants' smoking status was categorized as never smoker (<100 cigarettes during lifetime), former smoker (≥100 cigarettes during lifetime but not currently smoking), or current smoker (currently smoke cigarettes every day or on most days). Education level was categorized as high school diploma or less, some college, or college graduate.

Level of urbanization was assigned based on the participant's county of residence (2001-2014) or the county where the physical examinations occurred (2015-2016). Unweighted agreement between urbanization level based on county of residence and county of the examination was 99.9% for NHANES 2007-2014. County of residence and county of examination can be obtained through the research data center (https://www.cdc.gov/rdc/).

Urbanization level was based on 1990 (for NHANES 2001-2004), 2006 (for NHANES 2005-2012), and 2013 (for NHANES 2013-2016) NCHS classification schemes for counties.[15] The

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NCHS scheme was based on 4 metropolitan and 2 nonmetropolitan categories. The metropolitan categories included: (1) large central metropolitan or counties in metropolitan statistical areas (MSAs) with a population of 1 million or more that contain all or part of the area's principal city; (2) large fringe metropolitan or counties in MSAs with a population of 1 million or more that surrounded the large central metropolitan counties; (3) medium metropolitan or counties in MSAs with a population of 250 000 to 999 999; and (4) small metropolitan or counties in MSAs with a population of less than 250 000.

Nonmetropolitan, or the most rural areas, included: (1) micropolitan or counties in micropolitan statistical areas, which contained an urban cluster with 2500 to 49 999 inhabitants and (2) noncore or nonmetropolitan counties that did not qualify as micropolitan. The NCHS metropolitan categories were collapsed into the following 3 categories to increase the sample size and the degrees of freedom for the subgroup analysis: large MSAs (combined large central and fringe metropolitan counties); medium or small MSAs (combined medium and small metropolitan counties); and non-MSAs (combined micropolitan and noncore counties).

Statistical Analysis

Prevalence estimates of obesity and severe obesity and 95% CIs were calculated by sex, age group, race and Hispanic origin, education level, smoking status, and urbanization level for 2013-2016. Estimates were calculated for men and women separately because of known differences in patterns of obesity prevalence among adults by sex.[2,9,16]

Adjusted prevalence ratios, adjusted differences, and Wald 95% CIs were calculated for men and women separately using logistic regression models that included age group, race and Hispanic origin, education level, smoking status, and urbanization level.[17] Tests of trend over the categories of age group, education level, smoking status, and urbanization level (and their associated *P* values) were calculated by including these as continuous variables in the logistic regression models.

The analyses of trends in obesity and severe obesity from 2001-2002 to 2015-2016 by urbanization level were evaluated overall and for men and women separately. Obesity prevalence estimates by urbanization level from 2001 to 2016 were calculated using 4-year periods (2001-2004, 2005-2008, 2009-2012, and 2013-2016) to increase the stability and statistical reliability of the estimates. Linear and quadratic trends for age-adjusted obesity prevalence by urbanization level were tested using linear regression. The 2-year survey cycle was modeled as an orthogonal polynomial.[18]

Linear time trends by urbanization level were adjusted by age group, race and Hispanic origin, education level, and smoking status because these variables were associated with both obesity and urbanization level.[2,6,19] The linear regression estimate (β coefficient) for the continuous 2-year survey cycle can be interpreted as the average percentage point change every 2 years; the 95% CI and *P* value for this estimate also were calculated. The differences in the mean percentage point change in the prevalence of obesity and severe obesity were evaluated by testing the urbanization level × survey cycle interaction in the fully adjusted models.

The differences in obesity trends by urbanization level were further evaluated by examining changes in the distribution of BMI over time. Weighted and age-adjusted BMI distributions by sex, urbanization level, and period (2001-2004 vs 2013-2016) were calculated using local polynomial smoothing; statistical tests were not performed. The BMI distribution is presented as the probability density within the range of BMI in the actual data. The proportion of the population with a BMI within a given range is estimated by the area under the density curve within that range.

All analyses used sample weights for the NHANES physical examination that adjust for nonresponse, noncoverage, and unequal probabilities of selection. Four-year estimates were adjusted by age group using the direct method to the projected 2000 US census population.[20]

All variance estimates accounted for the complex sample design, which includes stratification and clustering in addition to weighting. The standard errors for prevalence estimates were calculated using Taylor series linearization and 95% CIs, and were constructed using the method by Korn and Graubard.[21] Effective sample size, absolute and relative 95% CI width, and degrees of freedom were evaluated to determine the reliability of prevalence estimates.[22]

A 2-sided *P* value of .05 was used to assess statistical significance. No adjustments were made for multiple comparisons. The analyses were conducted using R version 3.4.1 (R Foundation for Statistical Computing),[23] SAS version 9.4 (SAS Institute Inc), SUDAAN version 11.0 (RTI International), and Stata version 13 (StataCorp).

Results

The analyses of the 2013-2016 data excluded 135 pregnant women and 135 adults with missing height or weight data, leaving a total examined sample size of 10 792 adults (mean age, 48 years; 51% female [weighted]; unweighted percentage excluded, 270/11 062 = 2.4%). An additional 16 adults missing education level or smoking status were excluded from the analyses that included these variables.

Trend analyses between 2001-2002 and 2013-2016 excluded 1157 pregnant women, 883 adults missing height or weight data, and 17 adults missing urbanization level, leaving an examined sample size of 40 632 adults (unweighted percentage excluded, 2057/42 689 = 4.8%). An additional 77 adults with missing education level or smoking status were excluded from the trend analyses that adjusted for these variables. The sample sizes for men and women by age group, race and Hispanic origin, education level, smoking status, and urbanization level appear in **Table 1**.

Prevalence estimates for obesity and severe obesity in 2013-2016 by demographic characteristics and urbanization level appear in **Table 2** and the unweighted numbers appear in eTable 1 in the Supplement. Among all adults, 38.9% (95% CI, 37.0% to 40.7%) had obesity and 7.6% (95% CI, 6.8% to 8.6%) had severe obesity (eTable 2 in the Supplement).

The age-adjusted prevalence of obesity was 36.5% (95% CI, 34.0% to 39.0%) among men and 40.8% (95% CI,

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Table 1. Unweighted Sample Sizes for US Adults Aged 20 Years or Older With Body Mass Index Data by Sex, Age Group, Race and Hispanic Origin, Education Level, Smoking Status, and Urbanization Level From the National Health and Nutrition Examination Survey, 2013-2016

Characteristic	No. of Participants	
	Men	Women[a]
All	5221	5571
Age group, y		
20-39	1785	1805
40-59	1732	1949
≥60	1704	1817
Race and Hispanic origin[b]		
Non-Hispanic white	2021	2073
Non-Hispanic black	1086	1155
Non-Hispanic Asian	621	639
Hispanic	1313	1534
Education level[c]		
≤High school diploma	2455	2362
Some college	1430	1831
College graduate	1332	1375
Smoking status[c]		
Never smoker	2462	3691
Current smoker	1211	920
Former smoker	1541	956
Level of urbanization[d]		
Large MSAs	2951	3214
Medium or small MSAs	1562	1635
Non-MSAs	708	722

Abbreviation: MSAs, metropolitan statistical areas.

[a] Pregnant women were excluded.

[b] The National Health and Nutrition Examination Survey includes race and Hispanic origin groups not shown separately.

[c] Data do not sum to 5221 for men and 5571 for women due to missing values.

[d] Large MSAs indicate MSAs with a population of 1 million or more; medium or small MSAs are those with a population of less than 1 million; non-MSAs indicate counties not in a MSA.

38.7% to 42.9%) among women. The age-adjusted prevalence of severe obesity was 5.5% (95% CI, 4.6% to 6.6%) among men and 9.8% (95% CI, 8.7% to 11.0%) among women. The prevalence estimates and unweighted numbers for obesity and severe obesity stratified by sex, race and Hispanic origin, and age group appear in eTables 2 and 3 in the Supplement.

The adjusted differences and the adjusted prevalence ratios for obesity and severe obesity by age group, race and Hispanic origin, education level, smoking status, and urbanization level appear in Table 2. Adults aged 40 to 59 years had a significantly higher prevalence of obesity compared with adults aged 20 to 39 years among both men (39.0% vs 33.2%, respectively; adjusted difference, 6.1 percentage points [95% CI, 2.1 to 10.0 percentage points]) and women (44.7% vs 36.8%, respectively; adjusted difference, 8.7 percentage points [95% CI, 5.2 to 12.2 percentage points]).

Hispanic men had a significantly higher age-adjusted prevalence of obesity compared with non-Hispanic white men (40.6% vs 36.2%, respectively; adjusted difference, 7.0 percentage points [95% CI, 1.7 to 12.3 percentage points]). Non-Hispanic Asian men had a significantly lower age-adjusted prevalence of obesity compared with non-Hispanic white men (11.2% vs 36.2%, respectively; adjusted difference, −22.0 percentage points [95% CI, −25.1 to −18.9 percentage points]). However, the prevalence of obesity among non-Hispanic black and non-Hispanic white men was not significantly different.

The age-adjusted prevalence of obesity was significantly higher among non-Hispanic black women compared with non-Hispanic white women (55.9% vs 38.1%, respectively; adjusted difference, 16.9 percentage points [95% CI, 13.7 to 20.1 percentage points]). The age-adjusted prevalence of obesity was significantly higher among Hispanic women compared with non-Hispanic white women (48.9% vs 38.1%, respectively; adjusted difference, 8.3 percentage points [95% CI, 3.7 to 12.9 percentage points]). Non-Hispanic Asian women had a significantly lower age-adjusted prevalence of obesity compared with non-Hispanic white women (13.6% vs 38.1%, respectively; adjusted difference, −22.9 percentage points [95% CI, −26.5 to −19.3 percentage points]).

Men with some college education had a significantly higher age-adjusted prevalence of obesity than male college graduates (44.0% vs 30.0%, respectively; adjusted difference, 11.3 percentage points [95% CI, 6.0 to 16.6 percentage points]). However, the age-adjusted prevalence of obesity among men with a high school diploma or less was not statistically different from male college graduates.

There was a significant increasing linear trend in the prevalence of obesity with decreasing education level among women ($P < .001$). The age-adjusted prevalence of obesity was higher among women with some college compared with female college graduates (45.1% vs 29.3%, respectively; adjusted difference, 13.2 percentage points [95% CI, 9.7 to 16.7 percentage points]) and among women with a high school diploma or less compared with female college graduates (47.3% vs 29.3%, respectively; adjusted difference, 14.7 percentage points [95% CI, 10.7 to 18.7 percentage points]).

Men who currently smoked had a significantly lower age-adjusted prevalence of obesity compared with men who never smoked (31.1% vs 35.5%, respectively; adjusted difference, −6.8 percentage points [95% CI, −11.8 to −1.8 percentage points]). Men who were former smokers had a significantly higher age-adjusted prevalence of obesity compared with men who never smoked (40.2% vs 35.5%, respectively; adjusted difference, 4.1 percentage points [95% CI, 0.3 to 8.0 percentage points]). Among women, the prevalence of obesity did not differ significantly by smoking status.

There was a significantly increasing linear trend in obesity prevalence across the 3 categories of urbanization level from large MSAs to non-MSAs among both men and women ($P = .03$ for both). Men living in medium or small MSAs had a higher age-adjusted prevalence of obesity compared with men living in large MSAs (42.4% vs 31.8%, respectively; adjusted difference, 9.8 percentage points [95% CI, 5.1 to 14.5 percentage points]). However, the prevalence of obesity among men living in non-MSAs compared with men living in large MSAs was not significantly different (38.9% vs 31.8%, respectively; adjusted difference, 4.8 percentage points [95% CI, −2.9 to 12.6 percentage points]).

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Table 2. Unadjusted and Age-Adjusted Prevalence of Obesity and Severe Obesity Among US Adults Aged 20 Years or Older, 2013-2016

Characteristic	Men[a]					Women[a]				
	Prevalence, % (95% CI)		Adjusted Difference (95% CI), Percentage Points[c]	Adjusted Prevalence Ratio (95% CI)[c]	*P* Value[d]	Prevalence, % (95% CI)		Adjusted Difference (95% CI), Percentage Points[c]	Adjusted Prevalence Ratio (95% CI)[c]	*P* Value[d]
	Unadjusted	Adjusted for Age[b]				Unadjusted	Adjusted for Age[b]			
Obesity (BMI ≥30)[e]										
Overall	36.6 (34.1 to 39.1)	36.5 (34.0 to 39.0)				41.0 (38.9 to 43.1)	40.8 (38.7 to 42.9)			
Age group, y										
20-39	33.2 (29.6 to 37.0)		1 [Reference]	1 [Reference]		36.8 (34.5 to 39.0)		1 [Reference]	1 [Reference]	
40-59	39.0 (35.1 to 42.9)		6.1 (2.1 to 10.0)	1.18 (1.06 to 1.32)	.07	44.7 (40.5 to 48.9)		8.7 (5.2 to 12.2)	1.24 (1.14 to 1.34)	.05
≥60	38.0 (34.5 to 41.7)		3.6 (−2.5 to 9.7)	1.11 (0.93 to 1.32)		41.3 (37.8 to 44.9)		3.3 (−1.1 to 7.7)	1.09 (0.97 to 1.22)	
Race and Hispanic origin[f]										
Non-Hispanic white	36.9 (33.9 to 39.9)	36.2 (33.1 to 39.5)	1 [Reference]	1 [Reference]		38.8 (36.3 to 41.4)	38.1 (35.6 to 40.6)	1 [Reference]	1 [Reference]	
Non-Hispanic black	37.5 (33.7 to 41.4)	37.4 (33.8 to 41.2)	3.0 (−2.0 to 8.0)	1.08 (0.95 to 1.24)		56.1 (53.1 to 59.0)	55.9 (53.0 to 58.9)	16.9 (13.7 to 20.1)	1.44 (1.34 to 1.54)	
Non-Hispanic Asian	11.7 (9.3 to 14.5)	11.2 (8.8 to 13.9)	−22.0 (−25.1 to −18.9)	0.39 (0.33 to 0.46)		13.6 (11.1 to 16.5)	13.6 (11.1 to 16.5)	−22.9 (−26.5 to −19.3)	0.41 (0.34 to 0.49)	
Hispanic	41.2 (37.1 to 45.5)	40.6 (36.5 to 44.7)	7.0 (1.7 to 12.3)	1.19 (1.05 to 1.36)		48.4 (44.6 to 52.1)	48.9 (45.3 to 52.4)	8.3 (3.7 to 12.9)	1.21 (1.10 to 1.35)	
Education level										
≤High school diploma	36.2 (33.0 to 39.5)	36.2 (33.1 to 39.4)	3.6 (−1.6 to 8.7)	1.11 (0.95 to 1.30)		47.1 (44.0 to 50.1)	47.3 (44.5 to 50.1)	14.7 (10.7 to 18.7)	1.47 (1.32 to 1.64)	
Some college	43.8 (40.0 to 47.7)	44.0 (40.0 to 48.0)	11.3 (6.0 to 16.6)	1.36 (1.17 to 1.57)	.26	45.1 (42.3 to 47.8)	45.1 (42.5 to 47.7)	13.2 (9.7 to 16.7)	1.42 (1.29 to 1.57)	<.001
College graduate	30.3 (26.8 to 34.0)	30.0 (26.5 to 33.7)	1 [Reference]	1 [Reference]		29.6 (27.1 to 32.3)	29.3 (26.8 to 32.0)	1 [Reference]	1 [Reference]	
Smoking status										
Never smoker	35.6 (32.4 to 39.0)	35.5 (32.3 to 38.8)	1 [Reference]	1 [Reference]		39.1 (36.5 to 41.7)	39.0 (36.4 to 41.7)	1 [Reference]	1 [Reference]	
Current smoker	31.3 (27.7 to 35.1)	31.1 (27.5 to 34.9)	−6.8 (−11.8 to −1.8)	0.82 (0.70 to 0.95)	.06	41.9 (36.2 to 47.9)	41.2 (35.6 to 47.0)	−2.7 (−9.6 to 4.1)	0.93 (0.78 to 1.12)	.94
Former smoker	42.0 (38.3 to 45.7)	40.2 (36.6 to 43.8)	4.1 (0.3 to 8.0)	1.11 (1.01 to 1.23)		46.0 (40.9 to 51.2)	44.1 (39.6 to 48.6)	5.1 (−0.6 to 10.7)	1.13 (0.99 to 1.28)	
Level of urbanization[g]										
Large MSAs	31.8 (28.4 to 35.3)	31.8 (28.5 to 35.3)	1 [Reference]	1 [Reference]		38.4 (35.3 to 41.6)	38.1 (35.0 to 41.1)	1 [Reference]	1 [Reference]	
Medium or small MSAs	42.7 (38.0 to 47.4)[h]	42.4 (37.6 to 47.3)[h]	9.8 (5.1 to 14.5)	1.30 (1.15 to 1.48)	.03	42.7 (39.5 to 45.9)[h]	42.5 (39.2 to 45.9)[h]	4.3 (0.2 to 8.5)	1.11 (1.00 to 1.23)	.03
Non-MSAs	38.6 (29.2 to 48.7)[h]	38.9 (29.2 to 49.2)[h]	4.8 (−2.9 to 12.6)	1.15 (0.93 to 1.42)		46.3 (39.5 to 53.2)[h]	47.2 (40.7 to 53.7)[h]	4.7 (0.2 to 9.3)	1.12 (1.01 to 1.25)	

(continued)

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Table 2. Unadjusted and Age-Adjusted Prevalence of Obesity and Severe Obesity Among US Adults Aged 20 Years or Older, 2013-2016 (continued)

Characteristic	Men[a]					Women[a]				
	Prevalence, % (95% CI)		Adjusted Difference (95% CI), Percentage Points[c]	Adjusted Prevalence Ratio (95% CI)[c]	*P* Value[d]	Prevalence, % (95% CI)		Adjusted Difference (95% CI), Percentage Points[c]	Adjusted Prevalence Ratio (95% CI)[c]	*P* Value[d]
	Unadjusted	Adjusted for Age[b]				Unadjusted	Adjusted for Age[b]			
Severe Obesity (BMI ≥40)[e]										
Overall	5.5 (4.6 to 6.5)	5.5 (4.6 to 6.6)				9.7 (8.5 to 10.9)	9.8 (8.7 to 11.0)			
Age group, y										
20-39	6.1 (4.5 to 8.0)		1 [Reference]	1 [Reference]		9.8 (8.3 to 11.5)		1 [Reference]	1 [Reference]	
40-59	5.5 (4.1 to 7.3)		−0.5 (−2.2 to 1.2)	0.92 (0.69 to 1.22)	.23	11.5 (9.4 to 14.0)		2.0 (−1.1 to 5.0)	1.20 (0.91 to 1.58)	.03
≥60	4.7 (3.3 to 6.4)		−1.7 (−4.4 to 0.9)	0.72 (0.43 to 1.20)		7.2 (5.4 to 9.2)		−2.8 (−5.1 to −0.6)	0.71 (0.53 to 0.95)	
Race and Hispanic origin[f]										
Non-Hispanic white	5.5 (4.4 to 6.8)	5.6 (4.4 to 7.0)	1 [Reference]	1 [Reference]		9.2 (7.7 to 10.8)	9.4 (8.0 to 11.0)	1 [Reference]	1 [Reference]	
Non-Hispanic black	7.4 (5.8 to 9.3)	7.3 (5.8 to 9.2)	2.3 (0.3 to 4.4)	1.43 (1.05 to 1.93)		15.5 (12.9 to 18.4)	15.5 (12.9 to 18.4)	6.3 (3.5 to 9.0)	1.68 (1.35 to 2.10)	
Non-Hispanic Asian	0.4 (0 to 1.6)	0.4 (0 to 1.6)	−4.9 (−6.4 to −3.4)	0.10 (0.02 to 0.47)		0.3 (0 to 1.4)	0.3 (0 to 1.4)	−8.8 (−10.5 to −7.1)	0.04 (0.01 to 0.21)	
Hispanic	5.9 (3.9 to 8.6)	5.6 (3.9 to 7.8)	0.5 (−2.1 to 3.2)	1.10 (0.70 to 1.72)		10.6 (8.9 to 12.4)	10.3 (8.8 to 12.1)	1.1 (−1.7 to 3.9)	1.12 (0.85 to 1.49)	
Education level										
≤High school diploma	5.3 (4.0 to 6.8)	5.3 (4.1 to 6.8)	0.5 (−1.8 to 2.8)	1.12 (0.67 to 1.85)		9.9 (8.4 to 11.7)	10.2 (8.7 to 11.8)	2.6 (−0.2 to 5.5)	1.36 (0.96 to 1.94)	
Some college	7.6 (6.0 to 9.5)	7.7 (6.1 to 9.5)	3.0 (0.8 to 5.2)	1.69 (1.12 to 2.54)	.90	11.9 (9.7 to 14.4)	12.2 (9.9 to 14.8)	4.2 (0.9 to 7.6)	1.59 (1.08 to 2.33)	.19
College graduate	3.8 (2.7 to 5.2)	3.8 (2.7 to 5.2)	1 [Reference]	1 [Reference]		6.8 (5.0 to 9.0)	6.6 (4.9 to 8.8)	1 [Reference]	1 [Reference]	
Smoking status										
Never smoker	5.6 (4.3 to 7.1)	5.5 (4.3 to 7.0)	1 [Reference]	1 [Reference]		9.4 (8.0 to 10.9)	9.5 (8.1 to 11.0)	1 [Reference]	1 [Reference]	
Current smoker	4.8 (3.2 to 6.9)	4.8 (3.1 to 7.1)	−1.4 (−3.8 to 0.9)	0.75 (0.46 to 1.22)	.35	10.2 (8.3 to 12.3)	9.9 (8.1 to 12.1)	−1.2 (−3.2 to 0.7)	0.87 (0.70 to 1.08)	.71
Former smoker	5.9 (4.6 to 7.6)	6.3 (4.8 to 8.2)	0.4 (−1.5 to 2.4)	1.07 (0.77 to 1.48)		10.1 (7.9 to 12.7)	10.9 (8.4 to 13.8)	0.8 (−2.4 to 4.0)	1.08 (0.79 to 1.48)	
Level of urbanization[g]										
Large MSAs	4.1 (3.2 to 5.2)	4.1 (3.2 to 5.2)	1 [Reference]	1 [Reference]		8.1 (6.7 to 9.6)	8.1 (6.8 to 9.6)	1 [Reference]	1 [Reference]	
Medium or small MSAs	6.0 (4.1 to 8.4)[h]	6.1 (4.2 to 8.4)[h]	1.8 (0.0 to 3.6)	1.43 (1.01 to 2.01)	<.001	10.8 (8.7 to 13.4)[h]	11.1 (8.9 to 13.5)[h]	2.8 (0.3 to 5.4)	1.35 (1.03 to 1.77)	.004
Non-MSAs	9.3 (5.8 to 14.0)[h]	9.9 (6.3 to 14.7)[h]	5.0 (1.8 to 8.2)	2.21 (1.48 to 3.31)		12.6 (8.6 to 17.7)[h]	13.5 (9.5 to 18.3)[h]	3.7 (0.6 to 6.7)	1.45 (1.10 to 1.91)	

Abbreviations: BMI, body mass index; MSAs, metropolitan statistical areas.

[a] The estimates are weighted. The unweighted number of persons with obesity and severe obesity appears in eTable 1 in the Supplement.

[b] Adjusted using the direct method to the projected 2000 US census population using the age groups of 20-39, 40-59, and 60 years or older.

[c] Adjusted using multivariate logistic regression models that included all 5 characteristics in this Table.

[d] For linear trend.

[e] Calculated as weight in kilograms divided by height in meters squared.

[f] The National Health and Nutrition Examination Survey includes race and Hispanic origin groups not shown separately.

[g] Large MSAs indicate MSAs with a population of 1 million or more; medium or small MSAs are those with a population of less than 1 million; non-MSAs indicate counties not in a MSA.

[h] Standard error based on less than 8 degrees of freedom.

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The age-adjusted prevalence of obesity was higher among women living in medium or small MSAs compared with women living in large MSAs (42.5% vs 38.1%, respectively; adjusted difference, 4.3 percentage points [95% CI, 0.2 to 8.5 percentage points]). The age-adjusted prevalence of obesity was higher among women living in non-MSAs compared with women living in large MSAs (47.2% vs 38.1%, respectively; adjusted difference, 4.7 percentage points [95% CI, 0.2 to 9.3 percentage points]).

The prevalence of severe obesity did not differ significantly by age group among men. However, women aged 60 years or older had a significantly lower prevalence of severe obesity than women aged 20 to 39 years (7.2% vs 9.8%, respectively; adjusted difference, −2.8 percentage points [95% CI, −5.1 to −0.6 percentage points]).

Non-Hispanic black men had a significantly higher age-adjusted prevalence of severe obesity compared with non-Hispanic white men (7.3% vs 5.6%, respectively; adjusted difference, 2.3 percentage points [95% CI, 0.3 to 4.4 percentage points]). Non-Hispanic black women had a significantly higher age-adjusted prevalence of severe obesity compared with non-Hispanic white women (15.5% vs 9.4%, respectively; adjusted difference, 6.3 percentage points [95% CI, 3.5 to 9.0 percentage points]). Non-Hispanic Asian men had a significantly lower age-adjusted prevalence of severe obesity compared with non-Hispanic white men (0.4% vs 5.6%, respectively; adjusted difference, −4.9 percentage points [95% CI, −6.4 to −3.4 percentage points]). Non-Hispanic Asian women had a significantly lower age-adjusted prevalence of severe obesity compared with non-Hispanic white women (0.3% vs 9.4%, respectively; adjusted difference, −8.8 percentage points [95% CI, −10.5 to −7.1 percentage points]). However, among men and women there was no significant difference in the prevalence of obesity between non-Hispanic and Hispanic adults.

Men with some college had a higher age-adjusted prevalence of severe obesity compared with men who were college graduates (7.7% vs 3.8%, respectively; adjusted difference, 3.0 percentage points [95% CI, 0.8 to 5.2 percentage points]). Women with some college had a higher age-adjusted prevalence of severe obesity compared with women who were college graduates (12.2% vs 6.6%, respectively; adjusted difference, 4.2 percentage points [95% CI, 0.9 to 7.6 percentage points]). However, among men and women, there was no significant difference in the prevalence of severe obesity between those with a high school diploma or less and those who were college graduates.

The prevalence of severe obesity did not vary by smoking status among men or women. The prevalence of severe obesity showed a significant linear increase among both men and women across the 3 urbanization level categories from large MSAs to non-MSAs ($P < .001$ for men and $P = .004$ for women).

The age-adjusted prevalence of severe obesity was significantly higher among men living in medium or small MSAs compared with men living in large MSAs (6.1% vs 4.1%, respectively; adjusted difference, 1.8 percentage points [95% CI, 0 to 3.6 percentage points]). The age-adjusted prevalence of severe obesity was significantly higher among women living in medium or small MSAs compared with women living in large MSAs (11.1% vs 8.1%, respectively; adjusted difference, 2.8 percentage points [95% CI, 0.3 to 5.4 percentage points]).

The age-adjusted prevalence of severe obesity was significantly higher among men living in non-MSAs compared with men living in large MSAs (9.9% vs 4.1%, respectively; adjusted difference, 5.0 percentage points [95% CI, 1.8 to 8.2 percentage points]). The age-adjusted prevalence of severe obesity was significantly higher among women living in non-MSAs compared with women living in large MSAs (13.5% vs 8.1%, respectively; adjusted difference, 3.7 percentage points [95% CI, 0.6 to 6.7 percentage points]).

At all levels of urbanization, there were significantly increasing trends in the age-adjusted prevalence of obesity and severe obesity from 2001-2004 to 2013-2016 ($P < .001$ to $P = .03$ for linear trend), except that the increase in severe obesity among men living in medium or small MSAs was not statistically significant ($P = .20$ for linear trend) (**Table 3** and eFigures 1-4 in the Supplement). Trends were very similar in both the age-adjusted and fully adjusted models. There were no significant quadratic trends in any age-adjusted or fully adjusted model.

The prevalence of obesity increased at similar rates for both men and women at all urbanization levels (range, 0.8-1.6 percentage points every 2 years). The prevalence of severe obesity increased among adults living in large MSAs from 4.1% to 6.2% (β = 0.3 percentage points every 2 years [95% CI, 0.2 to 0.5 percentage points]). The prevalence of severe obesity increased among adults living in non-MSAs from 4.6% to 11.8% (β = 0.9 percentage points every 2 years [95% CI, 0.4 to 1.3 percentage points]).

Among men, the mean percentage point change every 2 years varied significantly by urbanization level ($P = .02$ for interaction). The prevalence of severe obesity increased among men living in large urban MSAs from 2.5% to 4.1% (β = 0.2 percentage points every 2 years [95% CI, 0 to 0.4 percentage points]) and among men living in non-MSAs from 2.8% to 9.9% (β = 1.0 percentage point every 2 years [95% CI, 0.4 to 1.5 percentage points]). Among women, the average percentage point change every 2 years did not vary significantly by level of urbanization.

The **Figure** shows weighted and age-adjusted BMI distributions in 2001-2004 and 2013-2016 by sex and urbanization level. The BMI distributions in 2013-2016 among adults living in non-MSAs appear shifted and skewed to the right of the 2001-2004 distributions, indicating that BMI has increased overall and that the proportion of adults with a BMI at the upper end of the distribution has increased. These shifts are more apparent among adults living in non-MSAs compared with those living in large MSAs among both men and women.

Discussion

The prevalence of obesity and severe obesity increased with decreasing level of urbanization from large MSAs to medium or small MSAs and non-MSAs. This pattern was seen among both men and women. The prevalence of obesity and severe

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Table 3. Trends in Prevalence of Obesity and Severe Obesity Among US Adults Aged 20 Years or Older, 2001-2004 to 2013-2016[a]

	Both Sexes						Men						Women					
	Large MSAs[b]		Medium or Small MSAs[b]		Non-MSAs[b]		Large MSAs[b]		Medium or Small MSAs[b]		Non-MSAs[b]		Large MSAs[b]		Medium or Small MSAs[b]		Non-MSAs[b]	
	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Obesity (BMI ≥30)[c]																		
2001-2004	4215	29.4 (27.1 to 31.7)	2895	33.8 (30.8 to 36.9)	1725	31.8 (27.8 to 36.0)	2144	27.4 (25.0 to 29.8)	1447	32.6 (29.2 to 36.2)	860	28.7 (25.3 to 32.3)	2071	31.3 (28.4 to 34.2)	1448	34.9 (30.5 to 39.4)	865	35.0 (29.7 to 40.6)
2005-2008	5638	30.9 (28.8 to 33.2)	2476	36.8 (32.3 to 41.6)[d]	1786	38.7 (35.5 to 41.9)	2809	29.5 (26.4 to 32.7)	1243	35.7 (28.9 to 42.9)[d]	928	36.9 (32.1 to 41.9)	2829	32.4 (29.6 to 35.2)	1233	37.9 (34.5 to 41.5)[d]	858	40.4 (37.1 to 43.8)
2009-2012	6458	32.0 (29.7 to 34.4)	2554	39.3 (34.3 to 44.4)[d]	2093	38.7 (35.5 to 42.1)	3172	30.8 (28.0 to 33.6)	1239	39.2 (32.7 to 45.9)[d]	1062	38.5 (34.2 to 43.0)	3286	33.1 (30.3 to 36.0)	1315	39.4 (34.3 to 44.7)[d]	1031	38.8 (35.4 to 42.4)
2013-2016	6165	35.1 (32.6 to 37.6)	3197	42.4 (39.0 to 45.9)[d]	1430	43.1 (36.0 to 50.4)[d]	2951	31.8 (28.5 to 35.3)	1562	42.4 (37.6 to 47.3)[d]	708	38.9 (29.2 to 49.2)[d]	3214	38.1 (35.0 to 41.1)	1635	42.5 (39.2 to 45.9)[d]	722	47.2 (40.7 to 53.7)[d]
P value[e]		.001		<.001		.001		.01		<.001		.004		.001		.002		.007
β (95% CI)[f,g]		1.1 (0.5 to 1.6)		1.5 (0.9 to 2.1)		1.5 (0.6 to 2.4)		0.8 (0.2 to 1.4)		1.6 (0.8 to 2.5)		1.5 (0.4 to 2.6)		1.4 (0.8 to 1.9)		1.4 (0.7 to 2.1)		1.6 (0.6 to 2.6)
Adjusted *P* value[f]		<.001		<.001		.002		.01		<.001		.01		<.001		<.001		.004
Severe Obesity (BMI ≥40)[c,h]																		
2001-2004	4215	4.1 (3.4 to 4.9)	2895	6.3 (5.2 to 7.5)	1725	4.6 (3.0 to 6.7)	2144	2.5 (1.8 to 3.2)	1447	4.5 (3.0 to 6.3)	860	2.8 (1.3 to 5.2)	2071	5.7 (4.6 to 7.1)	1448	8.0 (6.3 to 9.9)	865	6.4 (4.2 to 9.2)
2005-2008	5638	5.2 (4.4 to 6.2)	2476	6.2 (4.7 to 8.0)[d]	1786	7.0 (5.4 to 8.8)	2809	3.6 (2.8 to 4.6)	1243	5.0 (3.1 to 7.5)[d]	928	4.7 (3.4 to 6.2)	2829	6.8 (5.5 to 8.2)	1233	7.3 (5.4 to 9.6)[d]	858	9.3 (6.9 to 12.2)
2009-2012	6458	4.9 (4.3 to 5.6)	2554	8.2 (7.1 to 9.4)[d]	2093	7.6 (5.3 to 10.6)	3172	3.1 (2.3 to 4.0)	1239	5.0 (3.5 to 6.8)[d]	1062	6.5 (4.3 to 9.4)	3286	6.6 (5.8 to 7.5)	1315	11.0 (9.0 to 13.3)[d]	1031	8.7 (5.6 to 12.9)
2013-2016	6165	6.2 (5.3 to 7.2)	3197	8.6 (6.8 to 10.7)[d]	1430	11.8 (8.4 to 15.9)[d]	2951	4.1 (3.2 to 5.2)	1562	6.1 (4.2 to 8.4)[d]	708	9.9 (6.3 to 14.7)[d]	3214	8.1 (6.8 to 9.6)	1635	11.1 (8.9 to 13.5)[d]	722	13.5 (9.5 to 18.3)[d]
P value[e]		.003		.006		<.001		.03		.21		<.001		.02		.002		.02
β (95% CI)[f,g]		0.3 (0.2 to 0.5)		0.5 (0.2 to 0.7)		0.9 (0.4 to 1.3)		0.2 (0 to 0.4)		0.2 (−0.1 to 0.6)		1.0 (0.4 to 1.5)[h]		0.4 (0.2 to 0.7)		0.7 (0.3 to 1.0)		0.8 (0.2 to 1.4)
Adjusted *P* value[f]		<.001		.004		<.001		.02		.20		<.001		.002		<.001		.01

Abbreviations: BMI, body mass index; MSAs, metropolitan statistical areas.

[a] Prevalence estimates are weighted and adjusted for age using the direct method to the projected 2000 US census population and the age groups of 20-39, 40-59, and 60 years or older. The unweighted number of persons with obesity or severe obesity by sex and urbanization level appears in eTable 4 in the Supplement.

[b] Large MSAs indicate MSAs with a population of 1 million or more; medium or small MSAs are those with a population of less than 1 million; non-MSAs indicate counties not in a MSA.

[c] Calculated as weight in kilograms divided by height in meters squared.

[d] Standard error based on less than 8 degrees of freedom.

[e] Calculated using linear regression models adjusted for age only.

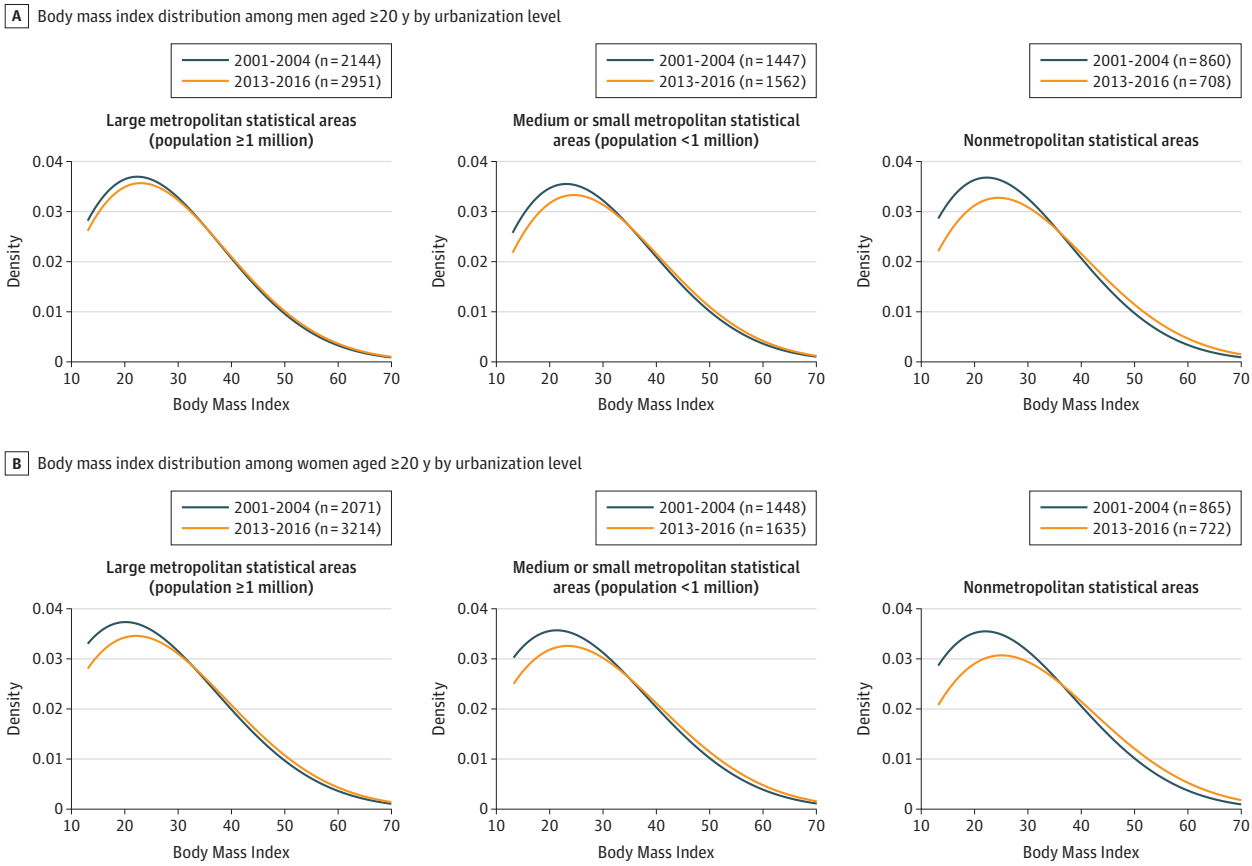
[f] From linear regression models that include the 2-year cycle of the National Health and Nutrition Examination Survey as a continuous variable and adjusted for age, race or Hispanic origin, education level, and smoking status.

[g] The β estimate can be interpreted as the fully adjusted average percentage point change in prevalence every 2 years.

[h] The β estimate varied significantly by urbanization level among men (*P* = .02 for interaction).

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Figure. Body Mass Index Distribution Among US Men and Women by Urbanization Level, 2001-2004 and 2013-2016



Data are from the National Health and Nutrition Examination Survey. The estimates are weighted and adjusted for age to the projected 2000 US census population using the age groups of 20 to 39 years, 40 to 59 years, and 60 years or older. The body mass index distributions were calculated using local polynomial smoothing. The proportion of the population with a body mass index within a given range is estimated by the area under the density curve within that range. The sample sizes are unweighted.

obesity also varied by age group, race and Hispanic origin, education level, and smoking status, often with different patterns by sex.

Shifts in BMI distribution between 2001-2004 and 2013-2016 toward the upper end are most evident among adults living in non-MSAs. The differences in the prevalence of obesity and severe obesity by urbanization level were not explained by demographic characteristics and smoking status.

The differences in the prevalence of obesity by urbanization level in the United States have been examined in previous studies.[3-6,24,25] However, the results are difficult to compare because of differing classification schemes for urbanization level and differences in obesity assessment. Many studies have reported differences using self-reported weight and height,[4,5,25] which are known to underestimate obesity prevalence,[26] and others have used measured height and weight.[3,6]

Previous reports[3,6] based on NHANES data from 2005-2008 reported that differences in the prevalence of obesity between urban and rural areas were independent of daily energy intake, percentage of calorie intake from fat, physical activity, and marital status. However, a study[24] based on earlier NHANES data (1976-1980) concluded that urban-rural differences in the prevalence of obesity were largely explained by age group, education level, and parity among women, and age group and marital status among men.

Urban-rural health disparities also have been reported for various health conditions such as diabetes and cardiovascular disease,[27] arthritis,[28] mental health disorders,[29] and prescription medication use.[30] Furthermore, compared with adults living in urban areas, those living in rural areas have higher mortality from certain chronic diseases,[31] suicide,[32] and all causes.[33] Life expectancy in rural areas in 2005-2009 was 2 years shorter than in metropolitan areas.[34]

Certain differences in health status may be related to differences in access to health services[35] and health-related behaviors such as physical activity, intake of sweetened beverages,[6] and cigarette smoking.[36] Differences by urbanization level in life expectancy[34] and smoking status[36] also have increased over time.

Limitations

This study has several limitations. First, BMI is an indirect measure of adiposity and health risk. The level of adiposity

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differs among age groups and race and Hispanic origin groups at the same BMI. For example, non-Hispanic black adults have lower adiposity compared with non-Hispanic white adults with the same BMI, and older adults have higher adiposity compared with younger adults with the same BMI.[37] Health risk begins at a lower BMI among Asian adults than among non-Hispanic white adults.[38]

Second, NHANES was not designed to provide estimates for individual urbanization levels. As a result, estimates for medium or small MSAs or non-MSAs are based on smaller sample sizes and fewer degrees of freedom, leading to imprecise estimates of standard errors.[22] The analysis of population subgroups within medium or small MSAs or non-MSAs also is limited.

Third, although sampling weights adjust for nonresponse, residual bias may remain due to incomplete nonresponse adjustment and may vary with changing response rates.

Conclusions

In this nationally representative survey of adults in the United States, the age-adjusted prevalence of obesity and severe obesity in 2013-2016 varied by level of urbanization, with significantly greater prevalence of obesity and severe obesity among adults living in nonmetropolitan statistical areas compared with adults living in large metropolitan statistical areas.

ARTICLE INFORMATION

Accepted for Publication: May 14, 2018.

Author Contributions: Dr Hales had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Hales, Ogden.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Hales.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Hales, Fryar, Carroll, Freedman, Aoki.
Supervision: Ogden.

Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

Funding/Support: The National Center for Health Statistics and the US Centers for Disease Control and Prevention funded this study.

Role of the Funder/Sponsor: The National Center for Health Statistics and the US Centers for Disease Control and Prevention had a role in the design and conduct of the National Health and Nutrition Examination Survey, in the collection and management of the data, and in the review and approval of the manuscript; however, the National Center for Health Statistics and the US Centers for Disease Control and Prevention had no role in the analysis and interpretation of the data, in the preparation of the manuscript, or in the decision to submit the manuscript for publication.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily reflect the official position of the National Center for Health Statistics and the US Centers for Disease Control and Prevention.

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BMI Cut Points to Identify At-Risk Asian Americans for Type 2 Diabetes Screening

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Diabetes Care 2015;38:150–158 | DOI: 10.2337/dc14-2391

POSITION STATEMENT

ASIAN AMERICAN POPULATION

According to the U.S. Census Bureau, an Asian is a person with origins from the Far East (China, Japan, Korea, and Mongolia), Southeast Asia (Cambodia, Malaysia, the Philippine Islands, Thailand, Vietnam, Indonesia, Singapore, Laos, etc.), or the Indian subcontinent (India, Pakistan, Bangladesh, Bhutan, Sri Lanka, and Nepal); each region has several ethnicities, each with a unique culture, language, and history. In 2011, 18.2 million U.S. residents self-identified as Asian American, with more than two-thirds foreign-born (1). In 2012, Asian Americans were the nation's fastest-growing racial or ethnic group, with a growth rate over four times that of the total U.S. population. International migration has contributed >60% of the growth rate in this population (1). Among Asian Americans, the Chinese population was the largest (4.0 million), followed by Filipinos (3.4 million), Asian Indians (3.2 million), Vietnamese (1.9 million), Koreans (1.7 million), and Japanese (1.3 million). Nearly three-fourths of all Asian Americans live in 10 states—California, New York, Texas, New Jersey, Hawaii, Illinois, Washington, Florida, Virginia, and Pennsylvania (1). By 2060, the Asian American population is projected to more than double to 34.4 million, with its share of the U.S. population climbing from 5.1 to 8.2% in the same period (2).

OVERWEIGHT/OBESITY AND TYPE 2 DIABETES RISK FOR ASIAN AMERICANS

Although it is clear that increased body weight is a risk factor for type 2 diabetes, the relationship between body weight and type 2 diabetes is more properly attributable to the quantity and distribution of body fat (3–5). Abdominal circumference and waist and hip measurements, although highly correlated with cardiometabolic risk (6,7), do not differentiate subcutaneous from visceral adipose abdominal depots and are subject to interobserver variability. Imaging and other approaches can be used to more accurately assess fat distribution and quantify adiposity (4,8), but they are not readily available, economical, or useable on a large scale. Therefore, the measurement of body weight with various corrections for height is frequently used to assess risk for obesity-related diseases because it is the most economical and practical approach in both clinical and epidemiologic settings (9). The most commonly used measure is Quetelet's index or BMI, defined as weight ÷ height^2, with weight in kilograms and height in meters. However, BMI does not take into account the relative proportions of fat and lean tissue and cannot distinguish the location of fat distribution (10,11).

The clinical value of measuring BMI from a diabetes diagnosis perspective lies in whether this measure can identify individuals who may have undiagnosed diabetes or may be at increased future risk for diabetes. In addition, measuring BMI also is important for managing diabetes for the purpose of weight control. BMI cutoffs have been established to identify overweight (BMI ≥25 kg/m^2) or obese (BMI ≥30 kg/m^2) individuals (12). However, these are based on information derived from the general population, based on risk of mortality, without consideration for racial or ethnic specificity and were not determined to specifically identify those at risk for diabetes. Recently, the U.S. Centers for Disease Control and Prevention presented initial findings from an oversampling of Asian Americans in the 2011–2012

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The position statement was reviewed and approved by the Professional Practice Committee in September 2014 and approved by the Executive Committee of the Board of Directors in October 2014.

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National Health and Nutrition Examination Survey. These data, utilizing general population criteria for obesity, showed the prevalence of obesity in Asian Americans was only 10.8% compared with 34.9% in all U.S. adults (13). Paradoxically, many studies from Asia, as well as research conducted in several Asian American populations, have shown that diabetes risk has increased remarkably in populations of Asian origin, although in general these populations have a mean BMI significantly lower than defined at-risk BMI levels (14,15). Moreover, U.S. clinicians who care for Asian patients have noticed that many with diabetes do not meet the published criteria for obesity or even overweight (16).

Epidemiologic studies have shown that there is a relationship between BMI and diabetes risk in Asians, but this risk is shifted to lower BMI values (17). At similar BMI levels, diabetes prevalence has been identified as higher in Asians compared with whites (18). This paradox may be partly explained by a difference in body fat distribution: there is a propensity for Asians to develop visceral versus peripheral adiposity, which is more closely associated with insulin resistance and type 2 diabetes than overall adiposity (19). Additionally, Asians of both sexes have been shown to have a higher percentage of body fat at any given BMI level compared with non-Hispanic whites; this suggests differences in body composition that may contribute to variations in diabetes prevalence (10).

DEFINING THE ISSUE

The established definitions of at-risk BMI for overweight and obesity appear to be inappropriate for defining diabetes risk in Asian Americans. Thus, there is a need to examine the existing literature to determine what might constitute at-risk BMI levels for Asian Americans. The clinical relevance is to clarify the use of BMI as a simple initial screening tool to identify Asian Americans who may have diabetes (diagnosis) or be at risk for future diabetes (to implement prevention measures). Also of importance is the use of specific BMI cut points to identify Asian Americans who are eligible for weight-reduction services or treatment reimbursable by payers.

Available data from Asia support the notion that Asians are already at risk for many obesity-related disorders even if they do not reach the BMI values associated with overweight or obesity in non-Asian populations (14). Population-wide weight gain is occurring throughout Asia. This has been attributed to environmental influences such as dietary changes and reductions in physical activity commonly associated with living in a Western culture (17). However, the impact of actually living in a Western culture may be different or more adverse than the effect of living in the native homeland and experiencing some of the lifestyle features representative of a Western culture. Rather than relying on hypothetical influences surmised from data from Asia, it is better therefore to directly examine the relationship of BMI to metabolic disorders such as type 2 diabetes among Asians living in the U.S. Although the U.S. Census has historically combined Asians, Native Hawaiians, and other Pacific Islanders, there are significant differences in physiology and body composition between Asians and the other two groups, so this review will focus only on examining studies in Asian Americans.

ASIAN AMERICAN STUDIES OF TYPE 2 DIABETES AND OVERWEIGHT/OBESITY

Prospective cohort or longitudinal studies are the most suitable designs to measure type 2 diabetes incidence and delineate the relationship between BMI and diabetes. This research requires clinical ascertainment of BMI and nondiabetic status at baseline, followed by periodic reascertainment for a defined follow-up period or until diabetes is diagnosed. Glucose tolerance status should be evaluated by blood test, preferably including a 2-h 75-g oral glucose tolerance test (OGTT). This recommendation is based on numerous studies, including research on Asian Americans, indicating that OGTT detects a greater number of individuals with diabetes compared with fasting glucose criteria (20–22). This type of longitudinal study design enables *1*) identification of baseline BMI values associated with increased diabetes risk over a defined follow-up and *2*) capture of BMI data at the earliest time point following diabetes diagnosis. The sensitivity and specificity of BMI cut points can then be identified using analytic techniques such as receiver operating characteristic curves or rate of misclassification.

Historically, such prospective cohort data are uncommon in Asian American populations. The majority of peer-reviewed publications on diabetes among Asian Americans are cross-sectional studies in which BMI, calculated from self-reported weight and height, and diabetes status are assessed simultaneously. In 2004, data from the Behavioral Risk Factor Surveillance System (BRFSS) showed that the odds of prevalent diabetes were 60% higher for Asian Americans than non-Hispanic whites after adjusting for BMI, age, and sex (23). The National Health Interview Survey (NHIS; 1997–2008 data) (24) found that the odds of prevalent diabetes were 40% higher in Asian Americans relative to non-Hispanic whites after adjusting for differences in age and sex. In fully adjusted logistic regression models including an adjustment for BMI as a categorical variable (underweight/normal weight: BMI <23 kg/m^2, overweight: $23 \leq$ BMI < 27.5 kg/m^2, and obese: BMI ≥ 27.5 kg/m^2), Asian Americans remained 30–50% more likely to have diabetes than their non-Hispanic white counterparts (24). Additionally, regional studies, such as the New York City Health and Nutrition Examination Survey (25), have confirmed that Asian residents in New York City had the highest levels of dysglycemia (diabetes and prediabetes combined) of any race/ethnicity based on prior history or fasting glucose measurement. By disaggregating subgroups from these studies, investigators found that South Asians consistently had the highest diabetes prevalence compared with other Asian subgroups and non-Hispanic whites (26). Although informative, these studies' cross-sectional designs were unable to identify BMI at the time of diabetes diagnosis thereby indicating minimum BMI cut points when diabetes is newly diagnosed.

A systematic review by Staimez et al. (27) summarized findings from 97 publications (1988–2009) on the prevalence of overweight, obesity, and diabetes among specific Asian American subgroups, including Chinese, Filipinos, Koreans, South Asians, and Vietnamese. Almost all the articles reviewed for this publication reported cross-sectional

data for the variables of interest, and only two provided longitudinal data that were incorporated in the conclusion. These earlier studies reported tremendous heterogeneity in diabetes prevalence, ranging from 3.9 to 32.9% in Asian Indians, 1.0–11.3% among South Asians, 2.2–28.0% in Chinese, 3.7–30.9% among Filipinos, 5.3–15.6% in Vietnamese, and 10.0–18.1% among Koreans (27). Similar heterogeneity was reported for obesity prevalence. As the objectives, age and sex distribution, recruitment methods, and ascertainment of BMI and diabetes varied broadly among these studies, it is not feasible to use these data to identify BMI cut points for diabetes manifestation. To do this, it is imperative to establish BMI levels that place populations at risk for diabetes prior to diabetes diagnosis as weight loss may occur either with undiagnosed diabetes or following diagnosis due to glycosuria or treatment with lifestyle intervention or pharmacologic agents that promote weight loss.

Since publication of the article by Staimez et al. (27), prospective cohort studies on diabetes incidence among Asians in North America (comprising the U.S. and Canada) have been limited to just five prospective cohorts (based on a PubMed search of the English literature published since 2009). Table 1 summarizes the prospective studies that have reported incident diabetes rates in Asian American populations. We reviewed these studies, based on whether data were analyzed by specific Asian ethnicity (disaggregated) or not (aggregated).

Aggregated Data

The Women's Health Initiative (28) enrolled postmenopausal women aged 50–79 years from 40 clinical centers nationwide from 1993 to 1998 and followed them for 10.4 years. Participants included 14,618 African American, 133,541 non-Hispanic white, 6,484 Latino/Hispanic, and 4,190 Asian American women. Although the Asian American women self-reported as being Chinese, Indo-Chinese, Japanese, Korean, Pacific Islander, or Vietnamese, data were not disaggregated into these separate ethnic groups.

Baseline BMI was measured at the clinic visit, and incident diabetes was based on self-reported affirmative responses that a doctor prescribed "pills for diabetes" or "insulin shots for diabetes, collected at annual follow-up visits." As shown in Table 1, mean baseline BMI among Asians was 24.8 kg/m^2, cumulative diabetes incidence was 10.6%, and the incidence rate was 1.13 per 100 person-years. Compared with non-Hispanic whites, Asian Americans had the highest risk for incident diabetes after adjusting for age, study arm, baseline BMI, physical activity, dietary quality, smoking status, family history of diabetes, and educational attainment (hazard ratio [HR] 1.86 [95% CI 1.68−2.06]).

Disaggregated Data

The Diabetes Study of Northern California (DISTANCE) from Kaiser Permanente Northern California (29), a large integrated health-delivery system, was a prospective study in which enrolled adults were followed for 1 year. Data were disaggregated into 12 single racial/ethnic groups, including 7 distinct Asian subgroups. Of the 1,912,916 individuals without prevalent diabetes in 2010, a total of 15,357 incident diabetes cases were identified in the following year. The incidence rates for diabetes were highest among Pacific Islanders (19.9/1,000 person-years), followed by South Asians (17.2), and Filipinos (14.7). The mean BMI at diagnosis among those who developed incident diabetes was 27.2 kg/m^2 in Chinese, 28.7 kg/m^2 in Japanese, 29.0 kg/m^2 in Filipinos, and 29.6 kg/m^2 in South Asians, compared with a mean BMI of 33.4 kg/m^2 in non-Hispanic whites, 35.5 kg/m^2 in African Americans, and 34.3 kg/m^2 in Latinos (A. Karter, personal communication). There was a consistent pattern across all racial/ethnic groups of lower BMIs among individuals with prevalent diabetes when compared with those with incident diabetes. Those with normal glucose levels had even lower BMI compared with prevalent or incident diabetes cases. However, in other prospective studies discussed in this section, the BMI used for analyses was collected at baseline and may have preceded diabetes diagnosis by 5–10 years, depending on the duration of study follow-up (28,30–32).

The Seattle Japanese-American Community Diabetes Study, conducted in King County, WA, was a community-based prospective study of type 2 diabetes in second- and third-generation adults of 100% Japanese ancestry in Seattle. This research has yielded many publications on the relationship between body weight and body fat distribution, as well as the prevalence and incidence of type 2 diabetes (33). Although publications from the Japanese-American Community Diabetes Study have repeatedly shown the importance of central and especially visceral fat as a risk factor for coronary heart disease (20), hypertension (34), impaired glucose tolerance (35), type 2 diabetes (36), metabolic syndrome (37), and insulin resistance (11), investigators also identified a relationship between BMI and diabetes incidence when BMI was the sole measurement of body fat examined (38).

Among 466 nondiabetic Japanese Americans with a mean BMI 24.1 ± 0.2 kg/m^2 at baseline, 49 developed diabetes at 5 years, based on a 75-g OGTT (30). Study participants who developed diabetes had a mean BMI of 24.9 ± 0.5 kg/m^2, while those remaining nondiabetic had a mean BMI of 24.0 ± 0.2 kg/m^2. These differences approached statistical significance ($P = 0.068$). However, among participants aged ≤55 years, men who developed diabetes were heavier than nondiabetic individuals, with mean respective BMIs of 28.7 ± 0.8 and 25.1 ± 0.3 kg/m^2 ($P < 0.001$), while the difference in women (25.1 ± 1.2 and 22.8 ± 0.3 kg/m^2) did not reach statistical significance. Among men or women aged >55 years, incident diabetes was not associated with baseline BMI. In participants ≤55 years of age, the 5-year relative risk of diabetes associated with BMI was 26.5 (95% CI 3.4−204) but was 0.8 (95% CI 0.4−1.7) for those >55 years of age. Thus in this analysis at 5 years, BMI predicted risk for diabetes in Japanese Americans ≤55 years of age but not in those >55 years of age.

In a subsequent analysis of 424 initially nondiabetic Japanese Americans who were followed for additional 5 years (total of 10 years), 74 developed diabetes (36). Those developing diabetes had a mean BMI of 25.4 ± 3.7 kg/m^2, while those who remained nondiabetic had a mean BMI of 23.8 ± 3.1 kg/m^2. The odds of incident diabetes for a 1 SD increase in BMI were 1.57 (95% CI 1.23−2.02). Thus, these two studies

Table 1—Prospective cohort studies (2009–2013) reporting incident diabetes in Asian American populations

Reference	Study, location, and follow-up	Sample size	Mean age, years	BMI, kg/m^2	Diabetes ascertainment method	Diabetes incidence
Aggregated data Ma et al., 2012 (28)	Women's Health Initiative (1993–2009) 40 centers throughout the U.S. Follow-up: 10.4 years	Asian*: 4,190 Black: 14,618 Hispanic: 6,484 White: 133,541	Asian: 63.0 (7.5) Black: 61.6 (7.1) Hispanic: 60.2 (6.8) White: 63.6 (7.2)	Asian: 24.8 (4.6) Black: 31.2 (6.7) Hispanic: 29.1 (5.8) White: 27.6 (5.8)	Self-report: physician prescribed "pills or insulin shots for diabetes"	Cumulative incidence % Asian: 10.6 Black: 17.0 Hispanic: 14.6 Incidence rate (per 1,000 person-years) Asian: 1.13 Black: 1.87 Hispanic: 1.67 White: 0.82
Disaggregated data Karter et al., 2013 (29)	DISTANCE study Northern California Mean follow-up: 1 year	1,704,363 Kaiser Permanente Northern California members with known ethnicity Filipino: 82,781 Chinese: 68,831 Japanese: 16,032 South Asian: 6,768 SE Asian: 1,876 Korean: 1,130 Vietnamese: 1,671 White: 968,943 Latino: 253,821 Black: 135,934	Filipino: 49.1 (16.2) Chinese: 51.6 (16.8) Japanese: 58.7 (17.7) South Asian: 43.4 (15.0) SE Asian: 37.7 (12.2) Korean: 49.6 (15.7) Vietnamese: 39.5 (11.6) White: 53.6 (18.0) Latino: 44.8 (16.5) Black: 48.8 (17.5)	Mean BMI at baseline Filipino: 26.6 (4.7) South Asian: 26.4 (4.7) SE Asian: 26.4 (5.2) Japanese: 25.4 (4.9) Korean: 24.9 (4.2) Vietnamese: 23.9 (4.1) Chinese: 24.2 (4.0) White: 28.3 (6.4) Black: 30.9 (7.5) Latino: 29.7 (6.4)	Based on medical records: ICD-9: 250 (inpatient or two or more outpatient diagnoses) Either FPG ≥126 mg/dL; random or postchallenge glucose ≥200 mg/dL Prescription for insulin or oral antihyperglycemic medications	Age- and sex-adjusted prevalence % South Asian: 15.9 Filipino: 16.1 SE Asian: 10.5 Japanese: 10.3 Korean: 9.9 Vietnamese: 9.9 Chinese: 8.2 White: 7.3 Latino: 14.0 Black: 13.7 Incidence rate (per 1,000 person-years) Korean: 20.3 South Asian: 17.2 Filipino: 14.7 SE Asian: 11.4 Japanese: 7.5 Chinese: 6.5 Vietnamese: 4.6 White: 6.3 Latino: 11.2 Black: 11.2

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Table 1—Continued

Reference	Study, location, and follow-up	Sample size	Mean age, years	BMI, kg/m^2	Diabetes ascertainment method	Diabetes incidence
Wander et al., 2013 (36)	Japanese-American Community Diabetes Study Seattle, WA Follow-up: 10 years	421 Japanese Americans, 54% male	51.4 years (34.0–75.1)	Baseline Mean: 24.1 (range 16.6–36.9) After 5 years Incident T2D: 24.9 Nondiabetic: 24.0 After 10 years Incident T2D: 25.4 Nondiabetic: 23.8	2-h 75-g OGTT	Cumulative incidence 20.4% 5-year incidence 9.3% 10-year incidence 17.6%
Chiu et al., 2011 (31)	Multiethnic Cohort Ontario Study Ontario, Canada Mean follow-up: 12.8 years (1996–2009)	South Asian: 1,001 Chinese: 866 White: 57,210 Black: 747	South Asian: 42 (36–49) Chinese: 42 (36–50) White: 46 (38–57) Black: 42 (36–51)	Self-reported BMI at baseline South Asian: 24.6 (22–27) Chinese: 22.6 (20.0–24.0) White: 26.1 (23.0–28.0) Black: 26.1 (23.0–28.0)	Linkage with Ontario diabetes database (from multiple administrative sources)	Incidence rate (per 1,000 person-years) Baseline BMI 18.5–23 White: 3.1 (2.7–3.6) South Asian: 11.6 (6.0–17.8) Chinese: 3.7 (1.1–6.4) Black: 7.3 (1.1–16.9) Baseline BMI 23–27.5 White: 6.9 (6.4–7.6) South Asian: 20.2(13.1–27.8) Chinese: 16.8 (8.4–25.2) Black: 14.1 (8.6–20.2) Baseline BMI ≥27.5 White: 19.0 (17.9–20.0) South Asian: 44.9(28.1–63.9) Chinese: 30.9 (10.9–52.6) Black: 28.9 (17.0–42.9)
Maskarinec et al., 2009 (32)	Hawaii Component of the Multiethnic Cohort Hawaii Mean follow-up: 12 years	Caucasian: 35,042 Japanese: 44,513 Hawaiian: 14,346 Other: 9,997	% in age category Japanese men <55: 29.6% 55–64: 27.5% ≥65: 42.9% Japanese women <55: 29.9% 55–64: 29.6% ≥65: 40.5% White men <55: 42.6% 55–64: 27.6% ≥65: 29.8% White women <55: 44.4% 55–64: 26.9% ≥65: 28.7%	% in BMI category Japanese men BMI <22: 18.5% BMI 22–24.9: 37.2% BMI 25–29.9: 37.2% BMI ≥30: 7.2% Japanese women BMI <22: 41.5% BMI 22–24.9: 29.7% BMI 25–29.9: 22.6% BMI ≥30: 6.2% White men BMI <22.0: 13.8% BMI 22.0–24.9: 31.6% BMI 25.0–29.9: 40.7% BMI ≥30.0: 13.9% White women BMI <22: 33.2% BMI 22.0–24.9: 27.4% BMI 25.0–29.9: 25.2% BMI ≥30.0: 14.1%	Insurance data, blood test	Incidence rate (per 1,000 person-years) White: 5.8 (5.0–6.6) Japanese: 12.5 (11.4–13.5) Hawaiian: 15.5 (13.3–17.6) Other: 12.2 (9.9–14.4)

Data are mean (SD) unless otherwise indicated. FPG, fasting plasma glucose; SE, Southeast; T2D, type 2 diabetes. *Self-reported Chinese, Indo-Chinese, Japanese, Korean, Pacific Islander, and Vietnamese.

indicate that BMI is a significant risk factor for incident diabetes in Japanese Americans and that the BMI levels at which diabetes develops are quite low. However, neither report provided an inflection point for BMI at which risk was significantly increased.

A multiethnic cohort study identified nondiabetic adults in Ontario, Canada, using Statistics Canada's 1996 National Population Health Survey and the Canadian Community Health Survey (31). Survey participants living in Ontario, aged ≥30 years at the time of survey, and who self-reported as South Asian (n = 1,001) or Chinese (n = 866) comprised the Asian cohorts and were followed for a median of 6 years. Also included were blacks (n = 747) and non-Hispanic whites (n = 57,210). BMI was based on self-reported weight and height at baseline, and incident diabetes cases were ascertained through record linkage with the population-based Ontario Diabetes Database using a validated administrative data algorithm. Participants were followed from the survey interview date to the date of diabetes diagnosis, death, or at the end of the study. At baseline, mean BMI was 24.6 kg/m^2 among South Asians, 22.6 kg/m^2 among Chinese, 26.1 kg/m^2 among blacks, and 26.1 kg/m^2 among non-Hispanic whites. Researchers found that incident diabetes risk, adjusted for age, sex, sociodemographic characteristics, and BMI, was significantly higher for South Asians (20.8/1,000 person-years; HR 3.40), blacks (16.3/1,000; 1.99), and Chinese (9.3/1,000; 1.87), compared with non-Hispanic whites (9.5/1,000). The BMI cutoff value at which diabetes incidence was equivalent to BMI 30 kg/m^2 for non-Hispanic whites was estimated at 24 kg/m^2 for South Asians, 25 kg/m^2 for Chinese, and 26 kg/m^2 for blacks. Additionally, the median age at diagnosis was younger for South Asians (49 years) and Chinese (55 years) compared with blacks (57 years) and non-Hispanic whites (58 years).

Last, the Multiethnic Cohort (32) in Hawaii included non-Hispanic whites, Native Hawaiians, and Japanese Americans. The Hawaii data from this cohort were linked to two diabetes care registries (Blue Cross/Blue Shield and Kaiser Permanente Hawaii). Incident type 2 diabetes was identified by self-report of medical conditions between 1999 and 2003, a medication questionnaire, and linkage with health insurance plans in 2007. Native Hawaiians had the highest incidence (15.5/1,000 person-years), followed by Japanese Americans (12.5/1,000), while non-Hispanic whites had the lowest incidence (5.8 cases/1,000). The authors compared the HR of incident diabetes at different BMI cut points for each racial/ethnic group and found that Japanese Americans had a significantly higher incidence of diabetes at BMI 22.0–24.9 kg/m^2 than Hawaiians or non-Hispanic whites. Diabetes risk for Japanese Americans was higher than for non-Hispanic whites at all BMI levels. Even at BMI cut points of <22 kg/m^2 and 22.0−24.9 kg/m^2, respectively, HRs were higher among Japanese Americans compared with non-Hispanic whites at BMI cut points of 25.0−29.9 kg/m^2.

NEW CROSS-SECTIONAL ANALYSIS

Most recently, in an effort to ascertain the lowest BMI cut point that might be practical for identifying Asian American adults (aged ≥45 years) with previously undiagnosed type 2 diabetes, a group of investigators presented a new analysis at the 2014 Scientific Sessions of the American Diabetes Association (ADA) based on combined data from four cohort studies (39).The data set included participants without a prior diabetes diagnosis, aged ≥45 years, with no non-Asian admixture. Participant data were obtained from the University of California San Diego Filipino Health Study, San Diego, CA (n = 421); North Kohala Study, Hawaii, HI (n = 115 Filipinos, 129 Japanese, 18 other Asian); Seattle Japanese-American Community Diabetes Study, Seattle, WA (n = 371); and the Mediators of Atherosclerosis in South Asians Living in America (MASALA), San Francisco, CA, and Chicago, IL (n = 609). All 1,663 participants underwent 2-h 75-g OGTT, and diabetes diagnosis was based on ADA 2014 criteria (40). In the total sample, a BMI ≥26 kg/m^2 cut point had the lowest misclassification rate (false-positive + false-negative rates) and highest Youden's index (sensitivity + specificity −1). Sensitivity approximated specificity at BMI ≥25.4 kg/m^2; however, limiting screening at BMI ≥25 kg/m^2 would miss 36% of Asian Americans with newly diagnosed type 2 diabetes. In the same study, Araneta et al. (39) found that screening Asian Americans at a BMI cut point of ≥23.5 kg/m^2 identified approximately 80% of those with undiagnosed type 2 diabetes. Among Japanese Americans, lowering the BMI screening cut point to ≥22.8 kg/m^2 achieved 80% sensitivity. The same study also showed that limiting screening to HbA_{1c} ≥6.5% fails to identify almost half of Asian Americans with diabetes and 44% who had isolated postchallenge hyperglycemia would be missed without an OGTT.

CONCLUSIONS

This comprehensive review and analysis of the association between BMI and diabetes in Asian Americans illustrates that Asian Americans have a higher prevalence of type 2 diabetes at relatively lower BMI cut points than whites. Given that established BMI cut points indicating elevated diabetes risk are inappropriate for Asian Americans, establishing a specific BMI cut point to identify Asian Americans with or at risk for future diabetes would be beneficial to the potential health of millions of Asian American individuals.

Generally, the rationale behind the conventional BMI cut point has been the observation that overweight and obese adults (18 years of age or older) with a BMI of ≥25 kg/m^2 have increased risks of both morbidity and mortality. Adults who meet or exceed the 25 kg/m^2 BMI threshold are at increased risk of developing coronary heart disease, hypertension, hypercholesterolemia, type 2 diabetes, and other diseases, in addition to showing increases in mortality (41). However, while the studies reviewed herein do indicate increased diabetes prevalence among Asian Americans with BMIs below the 25 kg/m^2 threshold, a recent study (42) found no evidence to suggest an increased risk of total mortality among Asian Americans within the BMI range of 20 to <25 kg/m^2. Therefore, it is important to note that the aim of this position statement is not to redefine BMI cut points that constitute overweight and obesity thresholds as they relate to mortality or morbidity in Asian Americans. Instead, the intent is to clarify how to use BMI as a simple initial screening tool to identify Asian Americans who may have diabetes or be at risk for future diabetes. The question being considered is the most appropriate BMI cut point indicative of

elevated risk of diabetes in Asian Americans. Historically, there has been a general acknowledgment that a BMI cutoff point lower than 25 kg/m^2 would increase the likelihood of identifying diabetes or diabetes risk in Asians. Thus in the Diabetes Prevention Program (DPP), a BMI value of 22 kg/m^2 was selected as the eligibility BMI for Asians (43). The 2014 ADA "Standards of Medical Care in Diabetes" (40) indicates that there is compelling evidence that lower BMI cut points, specifically BMI cutoff value of 24 kg/m^2 in South Asians and 25 kg/m^2 in Chinese, denote increased diabetes risk in some racial and ethnic groups, although the ADA Standards fall short of identifying an exact cut point. However in 2000, a group cosponsored jointly by the Regional Office for the Western Pacific (WPRO) of the World Health Organization, the International Association for the Study of Obesity, and the International Obesity Task Force published in an extensive monograph a recommendation that the BMI value to denote overweight in Asians should be $\geq$23 kg/m^2 and $\geq$25 kg/m^2 for obesity (44). Subsequently, the World Health Organization consultation group identified potential public health action points along the BMI continuum ranging from 23.0 to 27.5 kg/m^2 and proposed that each country make decisions regarding the definitions of increased risk for its population (45). They did not identify an exact cut point. In addition, some Asian countries have taken steps to set new BMI obesity cut points for their populations. In 1992, the Japan Society for the Study of Obesity (JASSO) decided to define BMI $\geq$25 kg/m^2 as obesity (46). In China, a BMI of 24 kg/m^2 was found to have the best sensitivity and specificity for risk-factor identification and was recommended as the cutoff point for overweight. A BMI of 28 kg/m^2 was found to identify risk factors with specificity approximately 90% and was recommended as the cutoff point for obesity (47). Likewise, the diagnostic cutoff for overweight BMI in India (48) is 23 kg/m^2.

Determining the optimal BMI cut point for identifying Asian Americans at elevated risk for diabetes is complex. There is tremendous heterogeneity among the Asian American subgroups. For example, data from the DISTANCE study might suggest a conventional BMI cut point of 25 kg/m^2 as an acceptable threshold (29), especially for South Asians and Southeast Asians. In contrast, the Women's Health Initiative (28), the Seattle Japanese-American Community Diabetes Study (36), the multiethnic cohort study from Canada (31), and the Multiethnic Cohort in Hawaii (32) would lend support to lowering the BMI cut point, especially for East Asians (Chinese and Japanese).

In light of the diabetes epidemic, there is an urgent need to increase early detection and activate the at-risk public toward diabetes prevention. Adopting a single lower and uniform BMI cut point for Asian Americans would serve to increase opportunities for education, intervention, behavior and lifestyle change, and diagnosis. In support of this approach, data from Araneta et al. (39) suggest that for diabetes screening purposes BMI cut points with a sensitivity of 80% fall consistently between 23–24 kg/m^2 for nearly all Asian American subgroups (with levels slightly lower for Japanese). This makes a rounded cut point of 23 kg/m^2 practical. In determining a single BMI cut point, it is important to balance sensitivity and specificity so as to provide a valuable screening tool without numerous false positives. Furthermore, for a screening tool to be most valuable, it must be at least as useful as other commonly available tools. A BMI cut point of 23 kg/m^2 will have greater sensitivity than the ADA general screening questionnaire's (ADA Type 2 Diabetes Risk Test) sensitivity of 70–80% (49). An argument can be made to push the BMI cut point to lower than 23 kg/m^2 in favor of even further increased sensitivity. However, this would lead to an unacceptably low specificity (13.1%) (39).

The authors of this position statement propose that the analysis of BMI and diabetes in Asian Americans and subsequent recommendation of an Asian American−specific BMI cut point of 23 kg/m^2 for diabetes screening in the U.S. have the advantage of being predicated on available data for Asian Americans, not Asian country data. In this way, this recommendation takes into consideration not only genetic and physiologic factors but also environmental and lifestyle context. Further, it is based on a comprehensive review of available literature with focus on longitudinal studies and includes data from several large Asian American subgroups.

However, the analysis is limited in several ways. First, no uniform method of diagnosis was used in the studies upon which this recommendation is based. Diagnostic methods ranged from medication usage data, self-report, HbA_{1c}, fasting blood glucose, and OGTT. Studies using diagnostic methods other than OGTT might have understated diabetes prevalence (20–22,39). Second, some studies were not based on BMI data available at the time of incident diabetes. Rather, most studies reported the association between baseline BMI and diabetes diagnosis, with these measurements as much as 5–10 years apart in some instances. Therefore, these data do not accurately reflect the relationship of BMI to diabetes diagnosis at the time of diagnosis. Third, the number of robust studies is limited. Additional research will help to further elucidate current findings on the relationship between BMI and incident diabetes in Asian Americans. Fourth, while some data exist for several Asian ethnic subgroups, insufficient disaggregated data are available for many of the Asian ethnic groups that comprise this very heterogeneous population.

Much is known about how to prevent diabetes for those at risk (primary prevention) and about how to prevent or reduce complications in those with diabetes (secondary prevention). Diabetes is no longer the same life-threatening, life-limiting condition it was a century or even several decades ago. However, without increased prevention and early diagnosis the benefits of these strategies will not be fully realized. Because Asian Americans' risk for diabetes is under-recognized based on the existing BMI criteria, this population may not be afforded the same opportunity as others for increased prevention and early diagnosis. It is imperative to better screen and diagnose America's fastest-growing ethnic group based on the BMI cut point that more appropriately applies to them. While more research is needed to identify better risk markers than BMI and future research efforts will undoubtedly bring us closer to understanding the metabolic profiles of specific ethnic subgroups, with the subsequent development of appropriate

personalized medicine, there is an urgent need for action now, even in the absence of perfect data.

ADA RECOMMENDATION

Testing for diabetes should be considered for all Asian American adults who present with a BMI of $\geq$23 kg/m^2.

Acknowledgments. The authors wish to recognize the encouragement received from the Asian Pacific American Diabetes Action Council; the Asian American, Native Hawaiian and Pacific Islander Subcommittee of the National Adult Strategies Committee of the ADA; and the Asian American, Native Hawaiian and Pacific Islander Diabetes Coalition and the investigators in the field whose work made this position statement possible. The authors also wish to thank Erika Gebel Berg, PhD (ADA) for her invaluable editorial contributions.

Duality of Interest. No potential conflicts of interest relevant to this article were reported.

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Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 66 / No. 50
December 22, 2017

Prevalence of Obesity Among Adults, by Household Income and Education — United States, 2011–2014

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Studies have suggested that obesity prevalence varies by income and educational level, although patterns might differ between high-income and low-income countries (*1*–*3*). Previous analyses of U.S. data have shown that the prevalence of obesity varied by income and education, but results were not consistent by sex and race/Hispanic origin (*4*). Using data from the National Health and Nutrition Examination Survey (NHANES), CDC analyzed obesity prevalence among adults (aged ≥20 years) by three levels of household income, based on percentage (≤130%, >130% to ≤350%, and >350%) of the federal poverty level (FPL) and individual education level (high school graduate or less, some college, and college graduate). During 2011–2014, the age-adjusted prevalence of obesity among adults was lower in the highest income group (31.2%) than the other groups (40.8% [>130% to ≤350%] and 39.0% [≤130%]). The age-adjusted prevalence of obesity among college graduates was lower (27.8%) than among those with some college (40.6%) and those who were high school graduates or less (40.0%). The patterns were not consistent across all sex and racial/Hispanic origin subgroups. Continued progress is needed to achieve the *Healthy People 2020* targets of reducing age-adjusted obesity prevalence to <30.5% and reducing disparities (*5*).

NHANES is a biannual cross-sectional survey designed to monitor the health and nutritional status of the civilian noninstitutionalized U.S. population (*6*). The survey consists of in-home interviews and standardized physical examinations conducted in mobile examination centers. During the physical examination, standardized measurements of weight and height were obtained. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Obesity was defined as a BMI ≥30 kg/m^2. The NHANES sample is selected through a complex, multistage probability design. Participants self-reported race/Hispanic origin, and were divided into five categories: non-Hispanic white, non-Hispanic black, non-Hispanic Asian, Hispanic and "other." During 2011–2014, non-Hispanic black, non-Hispanic Asian, and Hispanic persons, among other groups, were oversampled. A total of 308 non-Hispanic persons reporting other races or more than one race were placed in an "other" category, and their data were included in the overall results. The NHANES examination response rate for adults aged ≥20 years was 64.5% in the 2011–2012 survey and 63.7% in the 2013–2014 survey.

Household income was categorized using FPL information, which accounts for inflation and family size (https://aspe.hhs.gov/prior-hhs-poverty-guidelines-and-federal-register-references); income levels were designated as ≤130%, >130%

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to ≤350%, and >350% of FPL. The cut point for participation in the Supplemental Nutrition Assistance Program is 130% of the poverty level, and 350% provides relatively equal sample sizes for each of the three income groups. Education was categorized as high school graduate or less, some college, and college graduate.

All estimates were adjusted to account for the complex survey design, including examination sample weights. Estimates were age-adjusted to the 2000 projected U.S. Census population using the age groups 20–39, 40–59, and ≥60 years. Confidence intervals for estimates were calculated using the Wald method. Differences between income and education groups were tested using a two-sided, univariate t-statistic, with statistical significance defined as a p-value of <0.05. Temporal trends from 1999–2002 to 2011–2014 were analyzed using orthogonal contrasts and 2-year survey cycles. Pregnant women (122) and participants with missing weight or height (571) were excluded, resulting in a total sample size of 10,636 for the period 2011–2014. For estimates by FPL, an additional 851 participants were excluded because of missing FPL data, and for estimates by education, eight participants were excluded because information on education was missing.

During 2011–2014, the age-adjusted prevalence of obesity was 38.3% among women and 34.3% among men (Table). The prevalence of obesity was 34.5% among non-Hispanic white adults, 48.1% among non-Hispanic black adults, 11.7% among non-Hispanic Asian adults, and 42.5% among Hispanic adults.

Among women, prevalence was lower in the highest income group (29.7%) than in the middle (42.9%) and lowest (45.2%) income groups. This pattern was observed among non-Hispanic white, non-Hispanic Asian, and Hispanic women, but it was only significant for white women. Among non-Hispanic black women, there was no difference in obesity prevalence among the income groups.

Among men, the prevalence of obesity was lower in both the lowest (31.5%) and highest (32.6%) income groups compared with the middle-income group (38.5%). This pattern was seen among both non-Hispanic white and Hispanic men, although among non-Hispanic white men, the difference between the highest-income and middle-income groups was not statistically significant. Among non-Hispanic black men, obesity prevalence was higher in the highest income group (42.7%) than in the lowest income group (33.8%). There was no difference in obesity prevalence by income among non-Hispanic Asian men.

In 2011–2014, the prevalence of obesity was lower among women and men who were college graduates (27.8% [women], 27.9% [men]) than among women and men with some college (41.2%, 40.0%) and women and men who were high school graduates or less (45.3%, 35.5%). By race/Hispanic origin, the same pattern was seen among non-Hispanic white, non-Hispanic black, and Hispanic women, and also among non-Hispanic white men, although the differences were not all statistically significant. Although the difference was not statistically significant among non-Hispanic black men, obesity prevalence increased with educational attainment. Among

The *MMWR* series of publications is published by the Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30329-4027.

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2017;66:[inclusive page numbers].

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TABLE. Prevalence of obesity among adults,* by race/Hispanic origin, sex, household income (percentage of FPL), and education — National Health and Nutrition Examination Survey, 2011–2014

		Race/Hispanic origin				
		Overall	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
Characteristic	No.	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Overall	10,636	36.3 (34.7–38.0)	34.5 (32.4–36.7)	48.1 (45.5–50.7)	11.7 (9.8–13.7)	42.5 (39.8–45.3)
Women	5,413	38.3 (36.1–40.5)	35.5 (32.4–38.6)	56.9 (54.2–59.7)	11.9 (8.8–15.1)	45.7 (42.2–49.2)
Men	5,223	34.3 (32.6–36.1)	33.6 (31.4–35.7)	37.5 (34.3–40.8)	11.2 (8.8–13.6)	39.0 (35.4–42.5)
Household income, both sexes						
≤130% FPL	3,462	39.0 (36.9–41.0)	35.8 (32.8–38.7)	46.6 (43.2–50.0)	15.0 (9.7–20.3)	42.6 (38.1–47.1)
>130 to ≤350% FPL	3,331	40.8 (38.2–43.4)	40.2 (36.5–43.9)	48.8 (44.6–52.9)	11.2 (6.6–15.8)	45.0 (40.7–49.2)
>350% FPL	2,992	31.2 (28.3–34.2)†,§	30.6 (27.3–34.0)†,§	49.3 (43.4–55.1)	10.7 (8.3–13.1)	39.1 (33.9–44.3)
Household income, women						
≤130% FPL	1,835	45.2 (42.5–48.0)	42.0 (37.4–46.5)	55.8 (52.2–59.4)	17.2 (10.3–24.1)	48.7 (43.1–54.4)
>130 to ≤350% FPL	1,702	42.9 (40.1–45.8)	42.5 (38.8–46.1)	59.4 (53.7–65.2)	11.7 (5.6–17.7)	44.6 (37.4–51.8)
>350% FPL	1,453	29.7 (26.1–33.3)†,§	27.9 (24.0–31.9)†,§	56.7 (50.0–63.5)	9.7 (5.8–13.7)	42.9 (35.2–50.5)
Household income, men						
≤130% FPL	1,627	31.5 (28.5–34.4)	28.5 (24.4–32.6)	33.8 (28.9–38.6)	11.8 (4.7–18.9)	35.9 (30.9–40.8)
>130 to ≤350% FPL	1,629	38.5 (35.1–41.9)†	37.8 (32.7–43.0)†	35.6 (30.7–40.5)	10.3 (5.6–15.0)	44.6 (40.1–49.2)†
>350% FPL	1,539	32.6 (29.4–35.8)§	32.9 (29.2–36.6)	42.7 (35.8–49.6)†	11.8 (7.9–15.7)	35.6 (27.8–43.4)§
Education, both sexes						
High school graduate or less	4,714	40.0 (37.9–42.2)	38.1 (34.5–41.6)	46.6 (42.8–50.4)	11.5 (7.6–15.5)	43.8 (40.6–47.0)
Some college	3,231	40.6 (38.1–43.1)	39.2 (35.9–42.5)	50.5 (46.3–54.7)	12.4 (8.9–15.8)	42.9 (38.2–47.5)
College graduate	2,683	27.8 (25.0–30.7)¶,**	27.5 (24.1–30.9)¶,**	47.3 (43.3–52.1)	11.1 (8.7–13.6)	36.9 (30.6–43.2)¶
Education, women						
High school graduate or less	2,277	45.3 (42.3–48.3)	43.3 (38.7–47.8)	57.9 (53.2–62.6)	11.4 (6.1–16.7)	49.6 (45.6–53.7)
Some college	1,777	41.2 (38.5–43.9)	38.9 (35.1–42.7)	58.8 (53.8–63.9)	13.3 (7.6–19.0)	43.0 (36.3–49.8)
College graduate	1,355	27.8 (24.1–31.5)¶,**	27.0 (22.3–31.6)¶,**	52.1 (47.4–56.8)**	11.3 (7.6–15.0)	36.1 (26.5–45.6)¶
Education, men						
High school graduate or less	2,437	35.5 (33.0–37.9)	34.1 (29.7–38.5)	36.0 (30.7–41.2)	11.0 (5.7–16.2)	37.7 (34.0–41.4)
Some college	1,454	40.0 (35.9–44.1)	39.9 (34.7–45.1)	38.2 (32.7–43.7)	10.3 (5.6–15.1)	42.9 (36.0–49.9)
College graduate	1,328	27.9 (24.3–31.5)¶,**	28.1 (24.1–32.1)**	40.4 (32.4–48.3)	11.0 (7.9–14.1)	38.5 (28.1–48.8)

Abbreviations: CI = confidence interval; FPL = federal poverty level.
* Age-adjusted by the direct method to the 2000 projected U.S. Census population using the age groups 20–39, 40–59, and ≥60 years.
† Significantly different from ≤130% FPL, p<0.05.
§ Significantly different from >130 to ≤350% FPL, p<0.05.
¶ Significantly different from high school graduate or less, p<0.05.
** Significantly different from some college, p<0.05.

non-Hispanic Asian women and men and Hispanic men there were no differences in obesity prevalence by education level.

From 1999–2002 to 2011–2014 the prevalence of obesity increased among women in the two lower income groups, but not among women living in households with incomes above 350% of FPL. Obesity prevalence increased among men in all three income groups during this period (Figure 1). Obesity prevalence also increased among both women and men in all education groups except men who were college graduates (Figure 2).

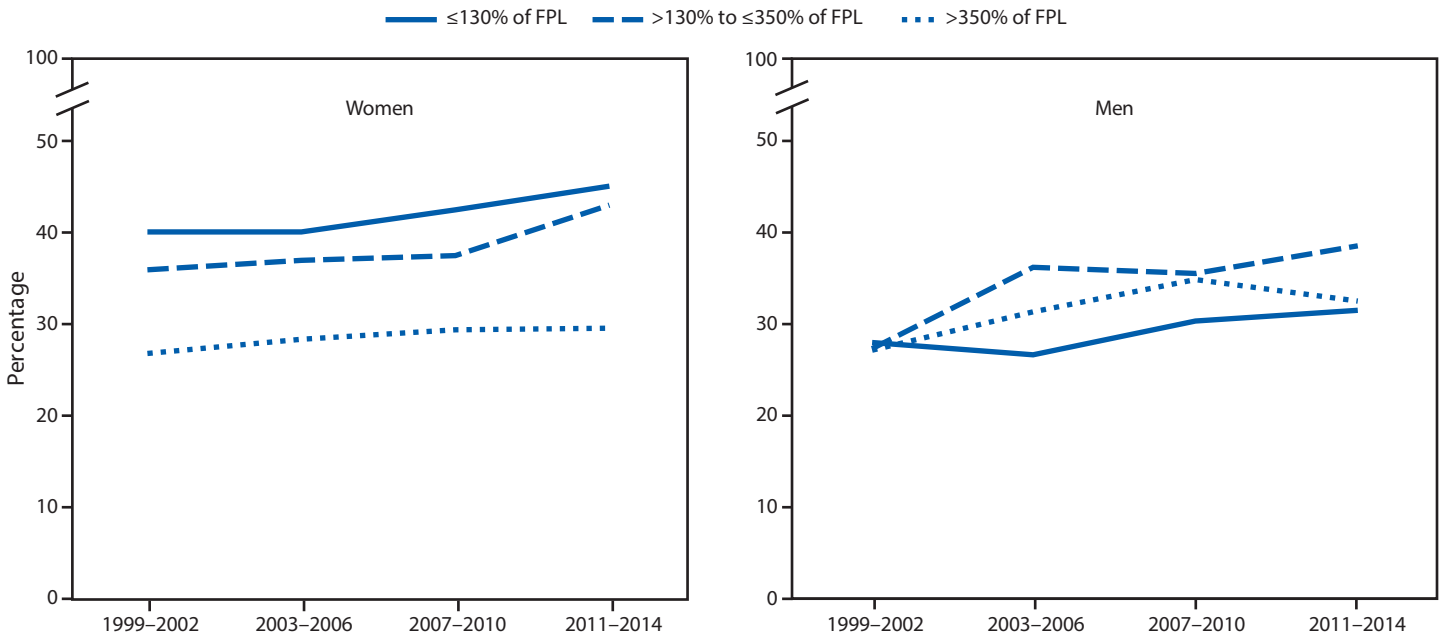
Discussion

During 2011–2014, the relationships between obesity and income, and obesity and education were complex, differing among population subgroups. Whereas overall obesity prevalence decreased with increased levels of income and educational attainment among women, the association was more complex among men.

Similar to results based on data from 2005–2008 (*4*), during 2011–2014, obesity prevalence was lower in the highest income group among women, but this was not the case among men. In fact, among non-Hispanic black men the prevalence of obesity was higher in the highest income group than in the lowest income group. Both women and men who were college graduates, on the other hand, had lower prevalences of obesity than did persons with less education.

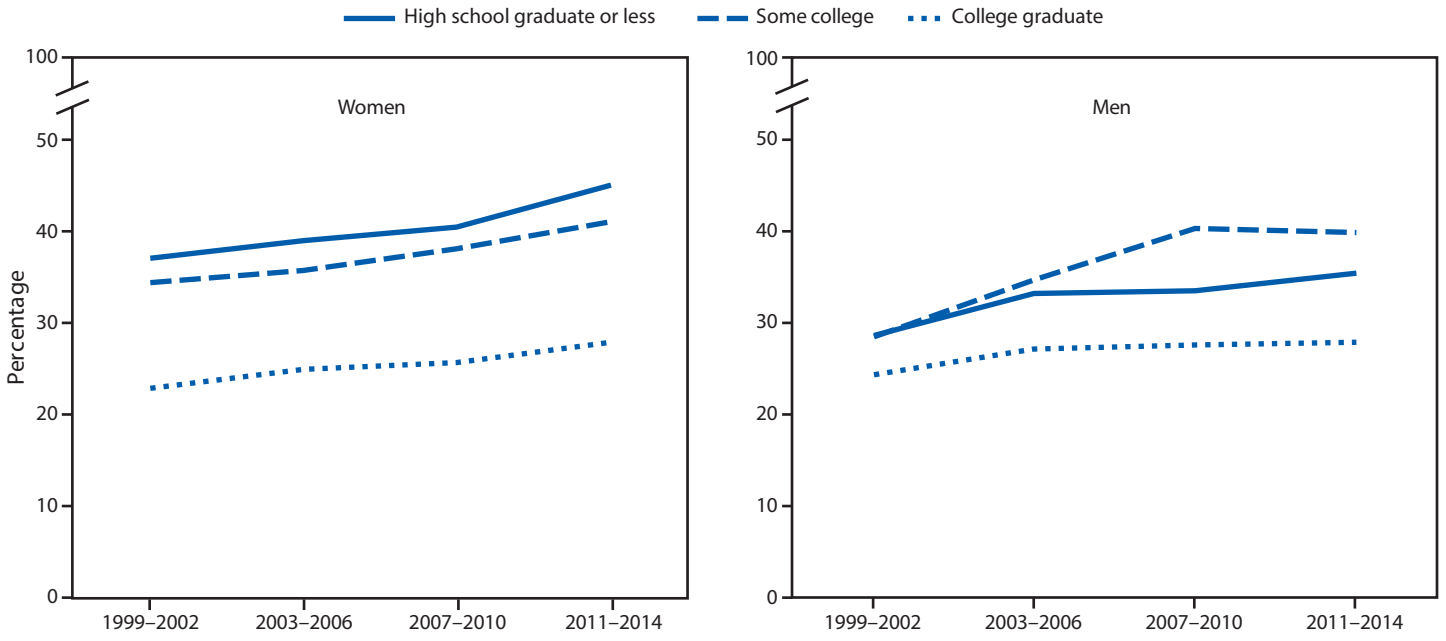
In general, prevalence of obesity among women was lowest among college graduates, although among non-Hispanic Asians there was no difference in prevalence by level of education. This relationship was not seen when obesity was examined by income level. For example, obesity prevalence was lower in the highest income group among non-Hispanic white women, but among non-Hispanic black women, prevalence did not differ between the highest and lowest household income groups. In contrast, among both non-Hispanic black women and non-Hispanic white women, the prevalence of obesity was lower among college graduates than among women with some college. This difference in the relationship between obesity and

FIGURE 1. Obesity prevalence among adults, by household income (percentage of FPL) and sex — National Health and Nutrition Examination Survey, 1999–2002 to 2011–2014*,†



Abbreviation: FPL = federal poverty level.
* Estimates age-adjusted by the direct method to the 2000 projected U.S. Census population using the age groups 20–39, 40–59, and ≥60 years.
† Significant linear trends for all groups except >350% of FPL for women. For >350% of FPL for men also significant quadratic trend. All p<0.05.

FIGURE 2. Obesity prevalence among adults, by education level and sex — National Health and Nutrition Examination Survey, 1999–2002 to 2011–2014*,†



* Estimates age-adjusted by the direct method to the 2000 projected U.S. Census population using the age groups 20–39, 40–59, and ≥60 years.
† Significant linear trends for all groups (p<0.01) except men who were college graduates. For women college graduates p = 0.056.

income and obesity and education has been reported in at least one other study (*7*) in children. These findings demonstrate that lower levels of income and education are not universally associated with obesity; the association is complex and differs by sex and race/Hispanic origin.

This is the first report to describe differences in obesity prevalence by income and education among non-Hispanic Asian adults. There were no significant differences in prevalence by income or education among either non-Hispanic Asian women or men; however, there was a pattern of decreasing prevalence with increasing income among non-Hispanic Asian women.

The findings in this report are subject to at least two limitations. First, BMI is a proxy for body fat and BMI ≥30 was applied to persons in all racial/Hispanic origin groups, which might result in underestimating health risks for certain populations. For example, it has been suggested that the BMI cut point (≥30 kg/m^2) that typically defines obesity might be too high for Asians and underestimate associated health risks (*8*,*9*). Second, the small sample size among some subgroups reduced the ability to detect differences when differences exist. Additional years of data might provide more information about obesity prevalence by income, especially among non-Hispanic Asian women.

Trends in obesity prevalence over time show that differences by income and education have existed at least since 1999–2002 among women. Among men, college graduates have consistently had a lower prevalence of obesity, whereas differences by household income have been less consistent. Further study is needed to understand the reasons for the different patterns by sex and race/Hispanic origin in the relationship between obesity and income or education.

Conflict of Interest

No conflicts of interest were reported.

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Summary

What is already known about this topic?

Studies have suggested that obesity prevalence varies by income or education, although patterns might differ in high and low income countries.

What is added by this report?

Analysis of data from the 2011–2014 National Health and Nutrition Examination Survey (NHANES) examining the association between obesity and education and obesity and income among U.S. adults demonstrate that obesity prevalence patterns by income vary between women and men and by race/Hispanic origin. The prevalence of obesity decreased with increasing income in women (from 45.2% to 29.7%), but there was no difference in obesity prevalence between the lowest (31.5%) and highest (32.6%) income groups among men. Moreover, obesity prevalence was lower among college graduates than among persons with less education for non-Hispanic white women and men, non-Hispanic black women, and Hispanic women, but not for non-Hispanic Asian women and men or non-Hispanic black or Hispanic men. The association between obesity and income or educational level is complex and differs by sex, and race/non-Hispanic origin.

What are the implications for public health practice?

NHANES will continue to be an important source of data on disparities in obesity prevalence. These data will help track the *Healthy People 2020* objective of reducing obesity disparities and might inform CDC, state, or local obesity prevention programs.

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Prevalence of Obesity Among Youths by Household Income and Education Level of Head of Household — United States 2011–2014

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Obesity prevalence varies by income and education level, although patterns might differ among adults and youths (*1*–*3*). Previous analyses of national data showed that the prevalence of childhood obesity by income and education of household head varied across race/Hispanic origin groups (*4*). CDC analyzed 2011–2014 data from the National Health and Nutrition Examination Survey (NHANES) to obtain estimates of childhood obesity prevalence by household income (≤130%, >130% to ≤350%, and >350% of the federal poverty level [FPL]) and head of household education level (high school graduate or less, some college, and college graduate). During 2011–2014 the prevalence of obesity among U.S. youths (persons aged 2–19 years) was 17.0%, and was lower in the highest income group (10.9%) than in the other groups (19.9% and 18.9%) and also lower in the highest education group (9.6%) than in the other groups (18.3% and 21.6%). Continued progress is needed to reduce disparities, a goal of *Healthy People 2020*. The overall *Healthy People 2020* target for childhood obesity prevalence is <14.5% (*5*).

NHANES is a cross-sectional survey designed to monitor the health and nutritional status of the civilian noninstitutionalized U.S. population (*6*). The survey consists of in-home interviews and standardized physical examinations conducted in mobile examination centers. The NHANES sample is selected using a complex, multistage probability design. During 2011–2014, non-Hispanic black, non-Hispanic Asian, and Hispanic persons, among other groups, were oversampled. Any non-Hispanic person reporting more than one race was included in an "other" category and included in the total estimates but not reported separately. The NHANES response rate for youths aged <20 years was 77.6% during 2011–2012 and 76.1% during 2013–2014. During the physical examination, standardized measurements of weight and height were obtained. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared, rounded to the nearest 10th. Obesity among youths was defined as a BMI at or above the age- and sex-specific 95th percentile of the 2000 CDC growth charts (https://www.cdc.gov/growthcharts/cdc_charts.htm).

Household income was defined using FPL information, which accounts for inflation and family size (https://aspe.hhs.gov/prior-hhs-poverty-guidelines-and-federal-register-references) and categorized as ≤130%, >130% to ≤350%, and >350% of FPL. The cut-off point for participation in the Supplemental Nutrition Assistance Program is 130% of FPL, and 350% provides relatively equal sample sizes for each income group. Education was defined using education level of head of household and was categorized as a high school graduate or less, some college, and college graduate.

All estimates accounted for the complex survey design including examination sample weights. Confidence intervals for estimates were constructed using the Korn and Graubard method (*7*). Differences between groups were tested using a 2-sided univariate t statistic ($p<0.05$). Linear and quadratic trends from 1999–2002 to 2011–2014 were conducted using 4-year survey cycles. Pregnant females and persons with missing weight or height were excluded (139) for a total sample size of 6,878 during 2011–2014. For estimates by FPL another 517 persons were missing data and were excluded from analyses of FPL; for estimates by education level, 224 persons were missing data and were excluded from analyses of education.

Overall, 17.0% of youths aged 2–19 years had obesity during 2011–2014 (Table). The prevalence was 18.9% among those in the lowest income group, 19.9% among those in the middle group, and 10.9% among those in the highest income group. Among females, patterns in non-Hispanic white, non-Hispanic Asian, and Hispanic youths were similar, with the prevalence of obesity lower in the highest income group than in both other groups, but the differences by income were statistically significant only among non-Hispanic white females. Obesity prevalence did not differ by income among non-Hispanic black females. Among males, there was a lower obesity prevalence in the highest income group only in non-Hispanic Asian youths (compared with the lowest income group) and Hispanic youths (compared with both other income groups).

Among youths, the prevalence of obesity decreased with increasing level of education of the head of household: 21.6% (high school graduate or less), 18.3% (some college), and 9.6% (college graduate). The same pattern was seen overall and in females and males in all race-Hispanic origin groups, but differences were not significant for non-Hispanic black youths (total, male, or female) or non-Hispanic Asian males or females.

From 1999–2002 to 2011–2014 the prevalence of obesity increased among females in the two lowest income groups (Figure 1). There was a nonsignificant decrease in obesity

TABLE. Prevalence of obesity among youths (persons aged 2–19 years), by race/Hispanic origin, sex, household income, and education of household head — National Health and Nutrition Examination Survey, United States, 2011–2014

Characteristic	No.	% (95% CI)				
			Race/Hispanic origin			
		All	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
Total	**6,878**	**17.0 (15.5–18.6)**	**14.7 (12.3–17.3)**	**19.5 (17.1–22.2)**	**8.6 (6.4–11.2)**	**21.9 (20.0–23.9)**
Females	3,371	17.1 (15.1–19.3)	15.1 (11.7–19.1)	20.7 (17.1–24.6)	5.3 (2.9–8.6)	21.4 (18.8–24.1)
Males	3,507	16.9 (15.1–19.0)	14.3 (11.2–17.9)	18.4 (16.1–21.0)	11.8 (8.3–16.1)	22.4 (19.9–24.9)
Household income relative to federal poverty level						
Total						
≤130%	3,131	18.9 (17.3–20.6)	15.5 (12.8–18.5)	19.4 (17.0–22.0)	13.2 (8.2–19.7)	22.8 (19.4–26.5)
>130% to ≤350%	1,974	19.9 (16.8–23.3)	18.0 (12.6–24.6)	19.9 (15.5–25.0)	8.9 (4.9–14.6)	23.7 (19.4–28.5)
>350%	1,256	10.9 (8.0–14.4)*,†	11.0 (7.3–15.7)	19.8 (12.2–29.4)	4.4 (1.9–8.4)*,§	11.8 (7.5–17.4)*,†
Females						
≤130%	1,539	19.7 (17.4–22.1)	17.8 (13.3–23.1)	19.9 (15.7–24.6)	8.4 (2.6–19.1)¶	22.5 (18.9–26.3)
>130% to ≤350%	969	21.5 (16.9–26.8)	21.2 (13.0–31.6)	21.6 (16.3–27.6)	8.2 (2.4–19.0)¶	22.7 (17.0–29.2)
>350%	613	8.0 (5.0–12.0)*,†	7.2 (3.5–12.8)*,†	21.1 (9.6–37.2)	1.3 (0.1–4.8)¶	13.8 (6.3–25.2)
Males						
≤130%	1,592	18.1 (15.5–21.0)	13.5 (9.2–18.7)	19.0 (15.7–22.6)	18.0 (10.1–28.6)	23.1 (18.0–28.9)
>130% to ≤350%	1,005	18.4 (15.6–21.4)	15.0 (10.0–21.2)	18.1 (12.1–25.5)	9.5 (3.9–18.7)§	24.6 (20.0–29.7)
>350%	643	13.7 (9.5–18.8)	14.7 (9.2–21.9)	18.7 (12.1–26.9)	7.6 (2.8–16.0)*,§	10.0 (4.8–17.9)*,†
Education level of head of household						
Total						
High school graduate or less	3,254	21.6 (20.0–23.3)	19.6 (16.2–23.3)	21.1 (17.5–25.0)	13.2 (8.5–19.3)	24.2 (20.9–27.7)
Some college	1,936	18.3 (15.4–21.5)**	17.6 (12.4–23.9)	19.7 (16.3–23.4)	12.0 (6.0–20.7)	19.9 (16.2–23.9)
College graduate	1,464	9.6 (7.3–12.5)**,††	8.5 (5.8–12.1)**,††	15.4 (9.8–22.5)	5.5 (3.1–8.9)**	13.5 (6.9–22.8)**
Females						
High school graduate or less	1,583	22.7 (20.7–24.9)	22.5 (17.5–28.1)	21.0 (16.0–26.7)	9.2 (4.4–16.5)	23.9 (20.1–28.0)
Some college	938	18.3 (14.6–22.6)**	18.0 (11.8–25.7)	22.1 (17.4–27.4)	8.0 (1.3–23.7)¶	17.3 (12.5–23.0)**
College graduate	739	8.5 (5.5–12.4)**,††	7.5 (3.9–12.8)**,††	16.3 (10.2–24.1)	3.3 (0.7–9.2)¶	14.0 (6.8–24.3)**
Males						
High school graduate or less	1,671	20.6 (18.1–23.2)	16.9 (11.6–23.3)	21.1 (17.5–25.1)	16.9 (9.0–27.7)	24.4 (20.5–28.7)
Some college	998	18.3 (14.7–22.4)	17.3 (11.0–25.3)	17.2 (13.4–21.6)	14.6 (6.7–26.4)	22.3 (15.9–29.8)
College graduate	725	10.7 (7.6–14.7)**,††	9.6 (5.5–15.2)**	14.5 (6.9–25.4)	7.9 (3.8–14.0)	12.9 (5.8–23.9) §,**

Abbreviation: CI = confidence interval.
* Significantly different from ≤130% of FPL, p<0.05.
† Significantly different from >130% to ≤350% of FPL, p<0.05.
§ Estimate might be unreliable because relative standard error is between 30% and 40%.
¶ Estimate might be unreliable because relative standard error is >40%.
** Significantly different from high school graduate or less, p<0.05.
†† Significantly different from some college, p<0.05.

prevalence among females in the highest income group, and the difference in childhood obesity prevalence between the lowest and highest income groups increased over time. Among males, a quadratic trend was observed in the lowest income group: obesity prevalence was 16.9% during 1999–2002, increased to 21.0% during 2007–2010, and then declined to 18.1% during 2011–2014. The difference in prevalence between the lowest and highest income groups did not change over time for males.

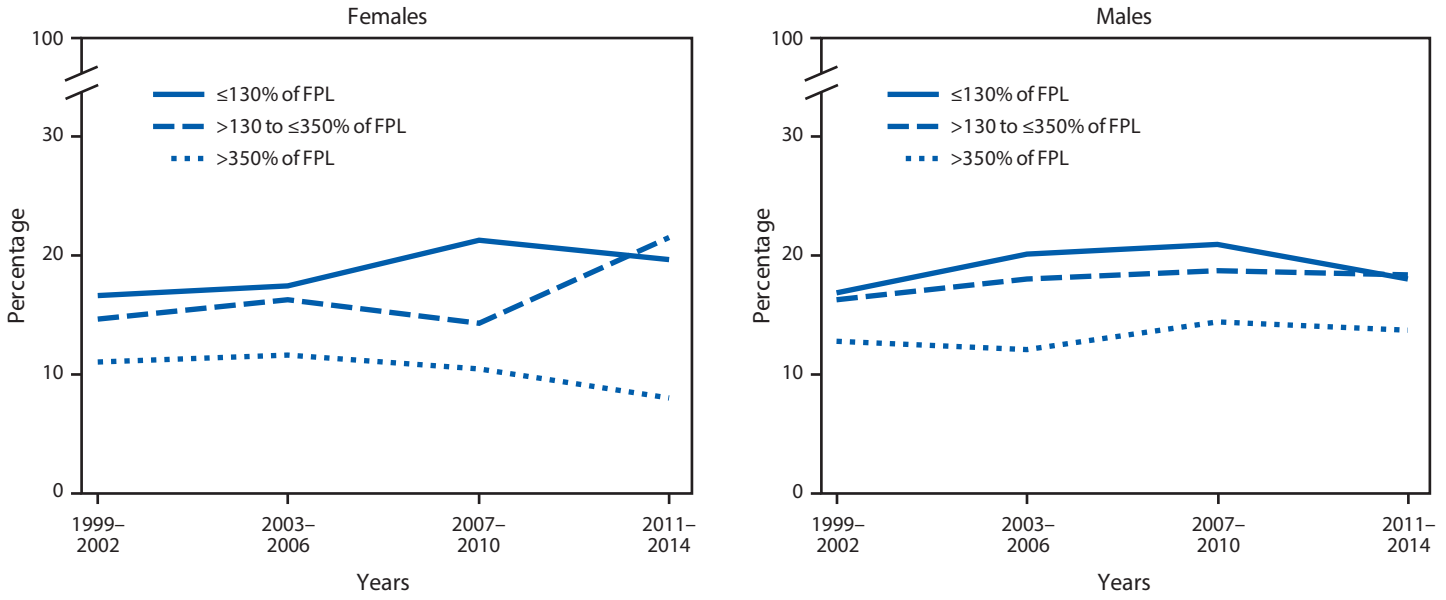
Obesity prevalence among youths increased from 1999–2002 to 2011–2014 among females and males in households headed by persons with the least education (high school graduate or less) and among females in households headed by persons with some college education. There were no other significant trends. In addition, the difference in childhood obesity prevalence between the lowest and highest head of household education groups increased over time for females but not for males (Figure 2).

Discussion

During 2011–2014, the relationships between childhood obesity and income and childhood obesity and education of household head were complex, differing depending upon the subgroup of the population. The prevalence of obesity among youths living in households headed by college graduates was lower than that among those living in households headed by less educated persons for each race-Hispanic origin group. The same was not true for those living in the highest income group. Moreover, differences by income and education of household head are widening among females.

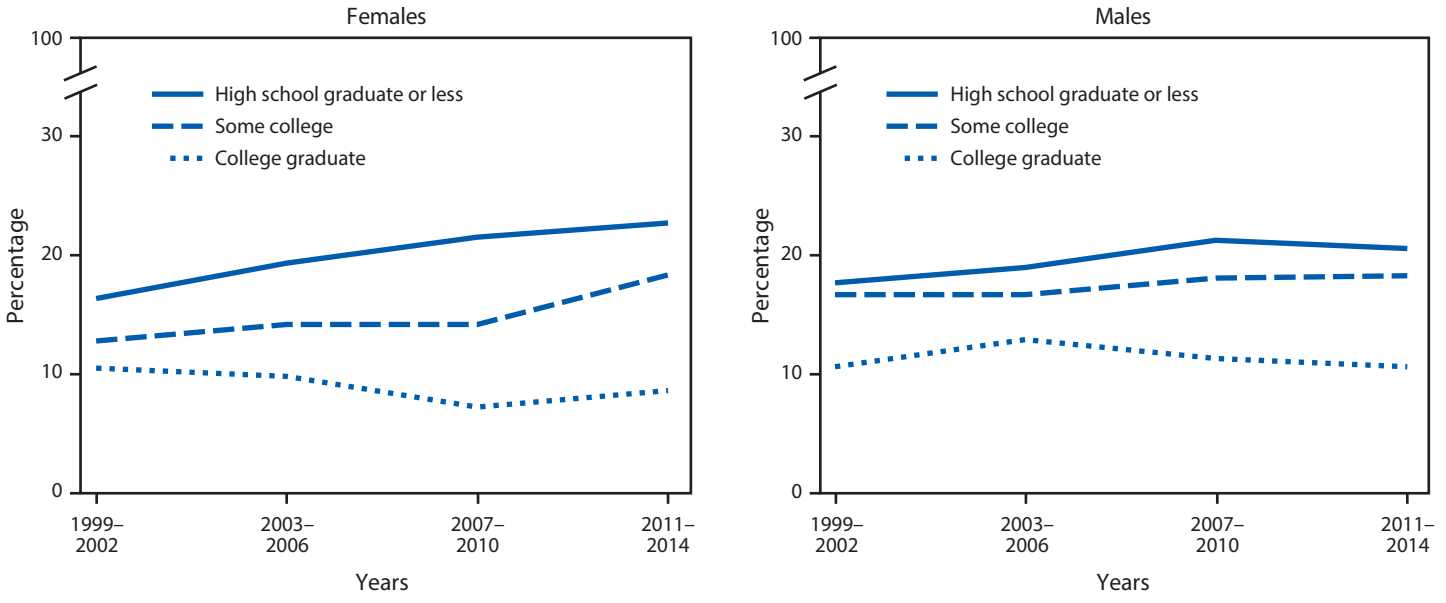
Similar to results based on data from 2005 to 2008 (*4*), during 2011–2014 childhood obesity prevalence was lower among

FIGURE 1. Trends*,† in obesity prevalence among youths (persons aged 2–19 years), by household income — National Health and Nutrition Examination Survey, United States, 1999–2002 through 2011–2014



Abbreviation: FPL = federal poverty level.
* Linear trend ($p<0.05$) for females ≤130% of FPL, >130% to ≤350% of FPL.
† Quadratic trend ($p<0.05$) for males ≤130% of FPL.

FIGURE 2. Trends* in prevalence of obesity among youths (persons aged 2–19 years), by education level of head of household — National Health and Nutrition Examination Survey, United States, 1999–2002 through 2011–2014



* Linear trend ($p<0.05$) for females, high school graduate or less and some college, and males, high school graduate or less.

youths living in households in the highest income group. However, this was not the pattern seen in all subgroups. For example, obesity prevalence was lower in the highest income group compared with the other groups among non-Hispanic white females, but not among non-Hispanic black females, non-Hispanic white males, or non-Hispanic black males. Obesity prevalence decreased as head of household education increased in all subgroups examined. The prevalence of obesity

Summary

What is already known about this topic?

Studies have suggested that childhood obesity prevalence varies by income and education, although patterns might differ between adults and youths.

What is added by this report?

Analysis of data from the 2011–2014 National Health and Nutrition Examination Survey (NHANES) demonstrates that childhood obesity prevalence patterns among persons aged 2–19 years by household income are less consistent by race and Hispanic origin than are the patterns by level of education attained by the head of household. Moreover, the differences in childhood obesity prevalence by income and education of household head are widening among females while differences among males have remained relatively constant over time.

What are the implications for public health practice?

NHANES will continue to be an important source of data for monitoring disparities in childhood obesity. These data will help track the *Healthy People 2020* objective of reducing disparities and might inform obesity prevention programs at the federal, state, and local levels.

was consistently lowest among children in households headed by college graduates, which differed from the pattern seen by income level. This difference in the relationship between obesity and income versus education has been observed in at least one other study (*8*). In addition, some relationships changed since 2005–2008. For example, there was a significant decreasing trend in obesity prevalence by income among non-Hispanic white males during 2005–2008 (*4*) but there were no differences during 2011–2014.

This report also presents differences in childhood obesity prevalence by income and education among non-Hispanic Asian youths in the United States. It has been suggested that the cut-off point that typically defines obesity might underestimate associated health risks among Asian persons (*9*).

The findings in this report are subject to at least one limitation. The sample size was small among some subgroups, such as non-Hispanic Asian females living in households with income above 350% of the FPL, where the prevalence of obesity is very low (1.3%) and the sample size is small (138). Additional years of data might provide more information about obesity prevalence by income, especially among non-Hispanic Asian youths.

Trends in childhood obesity prevalence by income and education level of head of household indicate that disparities have existed at least since NHANES III, 1988–1994 (*10*). These differences have widened since 1999–2002 among females but not among males, where differences in obesity prevalence by income and education of the head of household have remained relatively constant from 1999–2002 to 2011–2014.

These findings demonstrate that lower levels of income are not universally associated with childhood obesity. The association is complex and differs by sex, race, and Hispanic origin, and possibly over time. Differences by education are more consistent across subgroups than differences by income. More progress is needed to reduce disparities in childhood obesity prevalence, an important *Healthy People 2020* objective.

Conflict of Interest

No conflicts of interest were reported.

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JAMA | Original Investigation

Differences in Obesity Prevalence by Demographics and Urbanization in US Children and Adolescents, 2013-2016

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IMPORTANCE Differences in childhood obesity by demographics and urbanization have been reported.

OBJECTIVE To present data on obesity and severe obesity among US youth by demographics and urbanization and to investigate trends by urbanization.

DESIGN, SETTING, AND PARTICIPANTS Measured weight and height among youth aged 2 to 19 years in the 2001-2016 National Health and Nutrition Examination Surveys, which are serial, cross-sectional, nationally representative surveys of the civilian, noninstitutionalized population.

EXPOSURES Sex, age, race and Hispanic origin, education of household head, and urbanization, as assessed by metropolitan statistical areas (MSAs; large: ≥ 1 million population).

MAIN OUTCOMES AND MEASURES Prevalence of obesity (body mass index [BMI] ≥95th percentile of US Centers for Disease Control and Prevention [CDC] growth charts) and severe obesity (BMI ≥120% of 95th percentile) by subgroups in 2013-2016 and trends by urbanization between 2001-2004 and 2013-2016.

RESULTS Complete data on weight, height, and urbanization were available for 6863 children and adolescents (mean age, 11 years; female, 49%). In 2013-2016, the prevalence among youth aged 2 to 19 years was 17.8% (95% CI, 16.1%-19.6%) for obesity and 5.8% (95% CI, 4.8%-6.9%) for severe obesity. Prevalence of obesity in large MSAs (17.1% [95% CI, 14.9%-19.5%]), medium or small MSAs (17.2% [95% CI, 14.5%-20.2%]) and non-MSAs (21.7% [95% CI, 16.1%-28.1%]) were not significantly different from each other (range of pairwise comparisons *P* = .09-.96). Severe obesity was significantly higher in non-MSAs (9.4% [95% CI, 5.7%-14.4%]) compared with large MSAs (5.1% [95% CI, 4.1%-6.2%]; *P* = .02). In adjusted analyses, obesity and severe obesity significantly increased with greater age and lower education of household head, and severe obesity increased with lower level of urbanization. Compared with non-Hispanic white youth, obesity and severe obesity prevalence were significantly higher among non-Hispanic black and Hispanic youth. Severe obesity, but not obesity, was significantly lower among non-Hispanic Asian youth than among non-Hispanic white youth. There were no significant linear or quadratic trends in obesity or severe obesity prevalence from 2001-2004 to 2013-2016 for any urbanization category (*P* range = .07-.83).

CONCLUSIONS AND RELEVANCE In 2013-2016, there were differences in the prevalence of obesity and severe obesity by age, race and Hispanic origin, and household education, and severe obesity was inversely associated with urbanization. Demographics were not related to the urbanization findings.

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JAMA. 2018;319(23):2410-2418. doi:10.1001/jama.2018.5158

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Differences in childhood obesity prevalence by demographics have been reported in the United States,[1,2] and Healthy People 2020 objectives include reducing disparities.[3] In 2015-2016, obesity prevalence was higher in non-Hispanic black (22%) and Hispanic (26%) youth compared with non-Hispanic white (14%) and non-Hispanic Asian (11%) youth.[2] Although not nationally representative, in 2015, the prevalence of obesity among American Indian and Alaska Native youth was 30% (Indian Health Service National Data Warehouse).[4] Differences have also been reported by education and income.[5] Youth living in households headed by college graduates have a lower prevalence of obesity compared with youth living in households headed by individuals with less education. Similarly, youth in higher-income households have a lower prevalence of obesity than youth living in households with less income. These differences, however, vary by sex, and race and Hispanic origin and may be changing over time.[5]

Differences in obesity prevalence have also been reported by level of urbanization.[6-10] In 2011-2012, based on self-reported weight and height, the prevalence of overweight or obesity among US youth aged 10 to 17 years living in small rural areas was 38% compared with 30% among urban youth.[11] Measured weight and height from 1999-2006 showed that rural children aged 2 to 19 years had consistently higher odds of overweight and obesity even after adjustment for sociodemographics, health, diet, and exercise.[12]

This analysis presents national measured weight and height for 2013-2016 on obesity and severe obesity prevalence among US youth by demographic subgroup and by level of urbanization. Trends over time in obesity prevalence among US youth by age, race and Hispanic origin, income, and education of household head have been published,[1,5,13] but trends in obesity and severe obesity prevalence by urbanization level have not been well studied. Thus an objective of this analysis was to investigate trends by urbanization level from 2001 through 2016.

Key Points

Question In 2013-2016, were there differences in obesity and severe obesity prevalence by demographics and urbanization level among US children and adolescents?

Findings In this cross-sectional analysis that included 6863 children and adolescents aged 2 to 19 years, differences in obesity and severe obesity prevalence by age, race and Hispanic origin, and household education were found. Differences in obesity by urbanization levels were not significant, but the prevalence of severe obesity was significantly higher in non–metropolitan statistical areas (MSAs) (9.4%) than in large MSAs (5.1%).

Meaning Differences in age, race and Hispanic origin, or education of household head were not related to the difference in severe obesity by urbanization.

Methods

A nationally representative survey of the civilian, noninstitutionalized population, the National Health and Nutrition Examination Survey (NHANES) contains both interviews and examinations.[14] NHANES includes oversampling in its complex probability sample design. In 2013-2016, non-Hispanic black, non-Hispanic Asian, and Hispanic individuals were oversampled. NHANES began collecting data continuously in 1999 with public data releases every 2 years. Because of small sample sizes for some subgroups or due to low prevalence of some health conditions, multiple 2-year data cycles are often combined. Youth aged 7 to 17 years of age provided documented assent and, for youth 17 years and younger, parents or guardians provided permission. Participants 18 years and older provided consent. The National Center for Health Statistics (NCHS) research ethics review board approved NHANES. For youth aged 1 to 19 years, the response rate for the examination component was 76% in 2013-2014 and 64.6% in 2015-2016; response rates for youth from 2001-2002 to 2011-2012 ranged from 87% to 77%.[15]

Standardized measurements of weight and height were obtained during the NHANES examination. Obesity among youth aged 2 to 19 years was defined as body mass index (BMI [calculated as weight in kilograms divided by height in meters squared]) at or above the sex-specific 95th percentile of the US Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts.[16] Severe obesity was defined as BMI at or above 120% of the 95th percentile of the CDC BMI-for-age growth charts.[17,18]

Demographic variables included sex, age, race and Hispanic origin, and education of household head because previous analyses have found differences by these factors.[1,19] Age groups were 2 to 5, 6 to 11, and 12 to 19 years at time of examination and were the age groups used in the sample design. Race and Hispanic origin was reported by participants or proxy respondents (such as parents) and was categorized as non-Hispanic white, non-Hispanic black, non-Hispanic Asian, Hispanic, and other (including multiple races). Results for the "other" category were included in analyses of the entire population but were not shown separately. The term "race and Hispanic origin" is used in the text to reflect the specific designation in NHANES. Education of household head was categorized as high school diploma or less, some college, and college graduate.

Level of urbanization was assigned to each NHANES participant based on participant's county of residence (NHANES 2001-2014) or county location of examination (NHANES 2015-2016). Unweighted agreement between urbanization level categories based on county of residence and county location of examination was 99.9% for NHANES 2007-2014 participants. County of residence and county location of examination were not included in the public use NHANES data files due to disclosure risk, but can be obtained through the NCHS Research Data Center.[20] Level of urbanization was categorized based on 1990 (for NHANES 2001-2004), 2006 (for NHANES 2005-2012), and 2013 (for NHANES 2013-2016) NCHS classification schemes for

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counties.[21,22] The NCHS scheme is based on 4 metropolitan and 2 nonmetropolitan categories. The metropolitan categories included (1) large central metropolitan or counties in metropolitan statistical areas (MSAs) with a population of 1 million or more that contain all or part of the area's principal city; (2) large fringe metropolitan or counties in MSAs with a population of 1 million or more that surrounded the large central metropolitan counties; (3) medium metropolitan or counties in MSAs with a population of 250 000 to 999 999; and (4) small metropolitan or counties in MSAs with population of less than 250 000. Nonmetropolitan, or the most rural areas, included (1) micropolitan or counties with urban cluster populations from 10 000 to 49 999 and (2) noncore or metropolitan counties that did not qualify as micropolitan. For these analyses, urbanization was categorized as large MSA (combined large central and fringe metropolitan); medium or small MSA (combined medium and small metropolitan); and non-MSA (combined micropolitan and noncore). The NCHS metropolitan categories were collapsed for this analysis to increase sample size for subgroups and produce stable estimates based on the NCHS data presentation standards for proportions.[23]

Prevalence of obesity and severe obesity with 95% CIs were presented for each demographic subgroup and urbanization category. Estimates by urbanization category could not be presented by demographic subgroup due to small sample size and low degrees of freedom. Differences by urbanization category were tested using pairwise *t* tests and, adjusted for demographic characteristics, in logistic regression models. Adjusted prevalence ratios[24] and differences in the adjusted prevalence were presented. Ninety five percent CIs for the differences were constructed by the Wald method[25] using a *t* statistic with degrees of freedom equal to the minimum degrees of freedom of the standard errors of the 2 risk ratios. Urbanization category, age, and education were also included as continuous variables in the logistic models to test for adjusted linear trends in obesity and severe obesity by these variables. The Satterthwaite-adjusted *F* test[26] was used to assess statistical significance and the associated *P* values were reported.

To further investigate the association between urbanization category and obesity, smoothed, age-specific 50th and 95th percentiles of BMI were presented for each urbanization category. The percentiles were smoothed using weighted quantile regression with restricted cubic spline of age in months with 4 knots at the 5th, 35th, 65th, and 95th age percentiles.

Analysis of trends in obesity and severe obesity prevalence from 2001-2002 to 2015-2016 were conducted, stratified by urbanization category. Tabular and graphical presentation of obesity and severe obesity prevalence over this period included point estimates and CIs with combined 4-year NHANES data for 2001-2004, 2005-2008, 2009-2012, and 2013-2016 because these estimates were more stable than the estimates based on 2 years of data. Linear and quadratic trends in obesity prevalence by urbanization category were tested using orthogonal contrasts with 8 two-year survey cycles treated as a continuous variable. No significant interactions were found between urbanization category and survey period.

The NHANES complex sample design was incorporated in standard error estimates and all statistical testing. Taylor series linearization[27] was used to estimate standard errors. Examination sample weights were used in all analyses and adjusted for the differential probabilities of selection, noncoverage, and nonresponse. These adjustments accounted for loss between the screener and interview and between interview and examination. The approach described in Korn and Graubard was used to calculate CIs.[28] A 2-sided *P* value of .05 was used to assess statistical significance. No adjustments were made for multiple comparisons. Statistical reliability was assessed using the NCHS data presentation standards for proportions.[23] Analyses were conducted in SAS (SAS Institute), version 9.4; SUDAAN (RTI International), version 11.0; R (R Foundation), version 3.4.1; and Stata (StataCorp), version 13.

Results

In 2013-2016, 152 youth aged 2 to 19 years were missing weight, height, or both and 9 were pregnant and were excluded from the analysis (unweighted percentage, 161 of 7024 participants [2.3%]) leaving a total sample size of 6863. An additional 229 youth were missing data on education of household head and were excluded from analyses that included this variable. No data on urbanization were missing. Non-Hispanic Asian subgroups had the lowest unweighted sample sizes (eg, 52 for females aged 2 to 5 years), whereas Hispanic subgroups had the largest (eg, 260 for females aged 2 to 5 years). Sample sizes for all subgroups are included in **Table 1**. Unweighted numbers of children and adolescents with obesity or severe obesity are in eTable 1 and eTable 2 in the Supplement.

Analyses that included data from 2001-2002 to 2015-2016 included 29 292 youth (29 292 of 30 102 participants [97.3%] who were nonpregnant and examined). From 2001-2002 to 2015-2016, 810 youth were missing data on weight, height, or both or urbanization.

The prevalence of obesity among US youth aged 2 to 19 years was 17.8% (95% CI, 16.1% to 19.6%) and the prevalence of severe obesity was 5.8% (95% CI, 4.8% to 6.9%) in 2013-2016 (**Table 2**). Differences in adjusted prevalence and adjusted prevalence ratios (aPR) by sex, age, race and Hispanic origin, education of household head, and urbanization in 2013-2016 also are shown in Table 2. In adjusted analyses of obesity, there was a significant linear trend by age ($P < .001$). Obesity prevalence among youth aged 6 to 11 years (17.9%) and 12 to 19 years (20.6%) was significantly higher compared with youth aged 2 to 5 years (11.6%) (adjusted difference for youth aged 6-11 years vs 2-5 years, 6.9 percentage points [95% CI, 3.8 to 10.1]; aPR, 1.62 (95% CI, 1.30 to 2.01); adjusted difference for youth aged 12-19 years vs 2-5 years, 9.6 percentage points [95% CI, 5.6 to 13.5]; aPR, 1.85 [95% CI, 1.45 to 2.37]).

Obesity prevalence was also significantly higher among non-Hispanic black youth (20.4%) and Hispanic youth (23.6%) compared with non-Hispanic white youth (14.7%) (adjusted difference for non-Hispanic black youth vs non-Hispanic white youth, 4.97 percentage points [95% CI, 0.95 to 8.99]; aPR, 1.33

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Table 1. Unweighted Sample Sizes for US Youth Aged 2 to 19 Years With BMI Data by Sex, Age Group, Education of Household Head, and Race and Hispanic Origin in the National Health and Nutrition Examination Survey, 2013-2016

	Race and Hispanic Origin, No. of Participants				
		Non-Hispanic			
	All Groups[a]	White	Black	Asian	Hispanic
All	6863	1844	1669	612	2269
Age, y					
2-5	1657	468	414	129	510
6-11	2562	687	627	200	866
12-19	2644	689	628	283	893
Sex					
Male					
Age, y					
2-19 (Overall)	3490	981	857	326	1094
2-5	846	242	205	77	250
6-11	1292	367	320	108	413
12-19	1352	372	332	141	431
Female					
Age, y					
2-19 (Overall)	3373	863	812	286	1175
2-5	811	226	209	52	260
6-11	1270	320	307	92	453
12-19	1292	317	296	142	462
Education of household head[b]					
≤High school diploma	3108	592	730	180	1450
Some college	2065	649	648	105	506
College graduate	1461	557	256	282	224

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Includes race and Hispanic origin groups not shown separately.

[b] Sample sizes for education categories do not sum to 6863 due to missing values.

[95% CI, 1.07 to 1.66]; adjusted difference for Hispanic youth vs non-Hispanic white youth, 7.37 percentage points [95% CI, 4.36 to 10.38]; aPR, 1.49 [95% CI, 1.27 to 1.75]). There was no significant difference between non-Hispanic Asian youth (9.8%) and non-Hispanic white youth (adjusted difference, −3.5 percentage points [95% CI, 0 to −6.9]; aPR, 0.77 [95% CI, 0.58 to 1.02]).

There was a significant linear trend in obesity by education of household head ($P < .001$). The prevalence of obesity among youth living in households headed by individuals with a high school diploma or less (22.3%) or in households headed by individuals with some college education (18.1%) was significantly higher compared with youth living in households headed by college graduates (11.6%) (adjusted difference for youth living in households headed by individuals with ≤high school diploma vs youth living in households headed by college graduates, 7.5 percentage points [95% CI, 4.3 to 10.8]; aPR, 1.58 [95% CI, 1.25 to 1.98]; adjusted difference for youth living in households headed by individuals with some college education vs youth living in households headed by college graduates, 5.2 percentage points [95% CI, 1.0 to 9.4]; aPR, 1.40 [95% CI, 1.06 to 1.85]).

A linear trend in obesity across urbanization categories was not significant ($P = .11$). The prevalence of obesity in non-MSAs (21.7%) and medium or small MSAs (17.2%) was not significantly different compared with large MSAs (17.1%) (adjusted difference for large MSAs vs non-MSAs, 3.7 percentage points [95% CI, −2.4 to 9.8]; aPR, 1.22 [95% CI, 0.94 to 1.58]; adjusted difference for large MSAs vs medium or small MSAs, 1.0 percentage points [95% CI, −2.2 to 4.3]; aPR, 1.06 [95% CI, 0.91 to 1.24]).

Results from the adjusted analysis of severe obesity were similar to results for obesity (Table 2), although the estimated aPRs were farther from 1.0 for age and race and Hispanic origin, and severe obesity was significantly lower for non-Hispanic Asian youth (1.3%) compared with non-Hispanic white youth (4.4%) (adjusted difference, −3.1 percentage points [95% CI, −1.5 to −4.6]; aPR, 0.31 [95% CI, 0.13 to 0.73]). The linear trend across urbanization categories for severe obesity was significant ($P = .003$). Prevalence of severe obesity in non-MSAs (9.4%) was significantly higher than in large MSAs (5.1%) (adjusted difference, 4.1 percentage points [95% CI, 0.4 to 7.9]; aPR, 1.83 [95% CI, 1.26 to 2.66]). The prevalence of severe obesity in medium or small MSAs (5.3%) was not significantly different compared with large MSAs (adjusted difference, 0.9 percentage points [95% CI, −0.6 to 2.4]; aPR, 1.18 [95% CI, 0.93 to 1.50]).

Detailed estimates of obesity and severe obesity prevalence by sex, age, education of household head, and race and Hispanic origin are presented in **Table 3**.

There were no significant linear or quadratic trends in obesity or severe obesity prevalence from 2001-2004 to 2013-2016 for any urbanization category (range of $P = .07$ to .83) (**Table 4** and eFigures 1-2 in the Supplement). The same

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Table 2. Prevalence, Difference in Adjusted Prevalence, and Adjusted Prevalence Ratio for Obesity and Severe Obesity Among US Youth Aged 2 to 19 Years, 2013-2016[a]

Characteristic	Prevalence, % (95% CI)	Difference in Adjusted Prevalence, % (95% CI)[b]	Adjusted Prevalence Ratio (95% CI)[b]	Linear Trend Across Characteristic, *P* Value[b,c]
Obesity[d]				
Overall	17.8 (16.1 to 19.6)			
Sex				
Male	18.1 (16.0 to 20.4)	[Reference]	[Reference]	NA
Female	17.5 (15.4 to 19.6)	0.7 (−1.9 to 3.2)	1.04 (0.90 to 1.20)	
Age, y				
2-5	11.6 (9.8 to 13.6)	[Reference]	[Reference]	<.001
6-11	17.9 (15.5 to 20.5)	6.9 (3.8 to 10.1)	1.62 (1.30 to 2.01)	
12-19	20.6 (17.6 to 23.8)	9.6 (5.6 to 13.5)	1.85 (1.45 to 2.37)	
Race and Hispanic origin[e]				
Non-Hispanic white	14.7 (12.7 to 16.9)	[Reference]	[Reference]	NA
Non-Hispanic black	20.4 (17.1 to 24.1)	5.0 (1.0 to 9.0)	1.33 (1.07 to 1.66)	
Non-Hispanic Asian	9.8 (7.4 to 12.6)	−3.5 (−6.9 to 0)	0.77 (0.58 to 1.02)	
Hispanic	23.6 (21.2 to 26.1)	7.4 (4.4 to 10.4)	1.49 (1.27 to 1.75)	
Education of household head				
≤High school diploma	22.3 (20.3 to 24.4)	7.5 (4.3 to 10.8)	1.58 (1.25 to 1.98)	<.001
Some college	18.1 (15.1 to 21.3)	5.2 (1.0 to 9.4)	1.40 (1.06 to 1.85)	
College graduate	11.6 (9.1 to 14.5)	[Reference]	[Reference]	
Urbanization				
Large MSA	17.1 (14.9 to 19.5)	[Reference]	[Reference]	.11
Medium or small MSA	17.2 (14.5 to 20.2)[f]	1.0 (−2.2 to 4.3)	1.06 (0.91 to 1.24)	
Non-MSA	21.7 (16.1 to 28.1)[f]	3.7 (−2.4 to 9.8)	1.22 (0.94 to 1.58)	
Severe Obesity[g]				
Overall	5.8 (4.8 to 6.9)			
Sex				
Male	6.0 (4.9 to 7.3)	[Reference]	[Reference]	NA
Female	5.6 (4.4 to 7.1)	0.3 (−1.2 to 1.8)	1.05 (0.81 to 1.36)	
Age, y				
2-5	1.8 (1.1 to 2.7)	[Reference]	[Reference]	<.001
6-11	4.8 (3.8 to 6.0)	3.1 (1.6 to 4.5)	2.70 (1.59 to 4.59)	
12-19	8.4 (6.7 to 10.3)	6.8 (4.9 to 8.7)	4.78 (2.98 to 7.66)	
Race/Hispanic origin				
Non-Hispanic white	4.4 (3.4 to 5.7)	[Reference]	[Reference]	NA
Non-Hispanic black	7.9 (5.9 to 10.2)	3.4 (1.6 to 5.2)	1.76 (1.33 to 2.32)	
Non-Hispanic Asian	1.3 (0.5 to 3.0)	−3.1 (−4.6 to −1.5)	0.31 (0.13 to 0.73)	
Hispanic	8.4 (7.0 to 9.9)	3.8 (1.9 to 5.6)	1.84 (1.37 to 2.49)	
Education of household head				
≤High school diploma	7.7 (6.4 to 9.2)	2.4 (0.8 to 4.0)	1.57 (1.11 to 2.22)	.01
Some college	6.0 (4.5 to 7.8)	1.8 (−0.2 to 3.9)	1.44 (0.95 to 2.18)	
College graduate	3.3 (2.2 to 4.7)	[Reference]	[Reference]	
Urbanization				
Large MSA	5.1 (4.1 to 6.2)	[Reference]	[Reference]	.003
Medium or small MSA	5.3 (4.3 to 6.5)[f]	0.9 (−0.6 to 2.4)	1.18 (0.93 to 1.50)	
Non-MSA	9.4 (5.7 to 14.4)[f]	4.1 (0.4 to 7.9)	1.83 (1.26 to 2.66)	

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); MSA, metropolitan statistical area; NA, not applicable.

[a] Data from the National Health and Nutrition Examination Survey; estimates are weighted. See Table 1 for unweighted sample sizes and eTables 1 and 2 in the Supplement for unweighted No. of persons with obesity or severe obesity by age, sex, education of household head, race and Hispanic origin, and urbanization.

[b] Multivariate logistic regression model included all 5 characteristics.

[c] For linear trend.

[d] Obesity was defined as at or above the sex-specific 95th percentile of US Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts.

[e] Includes race and Hispanic origin groups not shown separately.

[f] Standard error degrees of freedom <8.

[g] Severe obesity was defined as ≥120% of the sex-specific 95th percentile of CDC BMI-for-age growth charts.

pattern was seen over time where the prevalence of obesity and severe obesity were higher in non-MSAs compared with large MSAs at each of the 4 periods. There was a significant linear trend across urbanization categories in prevalence of obesity (P = .006) and severe obesity (P < .001) when combining 16 years of data (2001-2016).

Smoothed estimates of the 50th and 95th percentiles of BMI by age for large MSAs, medium or small MSAs, and non-MSAs are shown in the **Figure**. The smoothed 95th percentile of BMI among adolescents aged 14 years living in non-MSAs was 38 (ie, 5% of adolescents aged 14 years had a BMI >38), whereas the 95th percentile among adolescents

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Table 3. Prevalence of Obesity and Severe Obesity Among US Youth Aged 2 to 19 Years, by Sex, Age, Education of Household Head, and Race and Hispanic Origin, 2013-2016[a,b]

	Prevalence by Race and Hispanic Origin, % (95% CI)				
		Non-Hispanic			
	All Groups[c]	White	Black	Asian	Hispanic
Obesity[d]					
Age, y					
2-5	11.6 (9.8-13.6)	9.9 (6.7-13.8)	11.6 (7.4-17.1)	7.0 (3.1-13.3)[e]	16.5 (13.4-20.0)
6-11	17.9 (15.5-20.5)	14.0 (11.3-17.1)	19.8 (16.6-23.3)	12.9 (7.5-20.2)	25.3 (22.2-28.7)
12-19	20.6 (17.6-23.8)	17.2 (12.6-22.6)	25.0 (19.8-30.8)	8.8 (5.7-12.7)	25.9 (22.9-29.0)
Sex					
Male					
Age, y					
2-19 (Overall)	18.1 (16.0-20.4)	15.3 (12.7-18.2)	17.9 (14.4-21.8)	11.9 (8.3-16.3)	24.3 (20.6-28.3)
2-5	11.5 (9.1-14.3)	9.3 (5.6-14.4)	12.4 (7.1-19.5)	9.1 (3.4-18.8)[e]	16.7 (11.7-22.8)
6-11	19.6 (16.4-23.2)	17.3 (13.3-21.9)	15.5 (11.7-19.9)	17.7 (8.0-31.8)[e]	26.1 (19.9-33.1)
12-19	20.0 (16.6-23.8)	16.3 (11.4-22.2)	22.0 (16.6-28.3)	9.1 (4.9-15.1)	26.7 (22.6-31.1)
Female					
Age, y					
2-19 (Overall)	17.5 (15.4-19.6)	14.1 (11.1-17.5)	23.0 (18.4-28.1)	7.4 (4.7-11.1)	22.9 (20.1-25.8)
2-5	11.7 (9.6-14.2)	10.4 (6.3-15.9)	11.0 (6.8-16.4)	4.3 (0.6-14.3)[e,f]	16.3 (11.7-21.8)
6-11	16.1 (13.5-19.0)	10.4 (6.8-15.0)	24.1 (19.4-29.4)	7.8 (3.2-15.3)[e]	24.5 (20.5-28.9)
12-19	21.2 (17.4-25.4)	18.1 (11.9-25.9)	28.2 (20.8-36.5)	8.4 (4.2-14.5)	25.0 (20.4-30.1)
Education of household head					
≤High school diploma	22.3 (20.3-24.4)	18.1 (14.3-22.6)	20.1 (14.8-26.2)	11.6 (7.0-17.7)	27.2 (24.3-30.3)
Some college	18.1 (15.1-21.3)	15.2 (10.8-20.7)	21.6 (18.0-25.5)	18.6 (9.6-30.9)	21.4 (17.9-25.2)
College graduate	11.6 (9.1-14.5)	11.5 (8.3-15.3)	19.0 (12.7-26.7)	6.4 (3.9-9.9)	9.1 (4.5-16.0)
Severe Obesity[g]					
Age, y					
2-5	1.8 (1.1-2.7)	1.1 (0.3-3.1)	2.1 (0.7-5.0)	0 ([h]-2.8)	2.7 (1.4-4.7)
6-11	4.8 (3.8-6.0)	3.1 (1.7-5.0)	6.5 (4.7-8.8)	2.4 (0.7-5.6)	8.0 (6.3-10.0)
12-19	8.4 (6.7-10.3)	6.7 (4.9-9.0)	11.5 (7.5-16.6)	1.1 (0.2-3.3)	11.6 (9.5-14.0)
Sex					
Male					
Age, y					
2-19 (Overall)	6.0 (4.9-7.3)	4.1 (3.0-5.5)	7.2 (5.1-9.9)	1.8 (0.6-4.0)	9.8 (7.6-12.3)
2-5	1.4 (0.7-2.4)	0.4 (0.0-2.2)	3.0 (0.9-7.5)[e]	0 ([h]-4.7)	2.8 (1.1-5.7)
6-11	4.8 (3.4-6.5)	3.2 (1.6-5.8)	4.2 (2.3-7.1)	2.4 (0.4-7.4)[e]	9.1 (6.1-13.0)
12-19	8.9 (6.9-11.4)	6.3 (4.1-9.3)	11.1 (6.5-17.4)	2.2 (0.4-6.7)[e]	13.7 (10.6-17.3)
Female					
Age, y					
2-19 (Overall)	5.6 (4.4-7.1)	4.7 (3.1-6.9)	8.5 (5.9-11.9)	0.8 (0.1-3.3)	6.9 (5.2-8.9)
2-5	2.1 (1.0-3.9)	1.9 (0.3-5.9)[e]	1.3 (0.1-5.2)[e]	0 ([h]-6.8)[f]	2.6 (1.0-5.4)
6-11	4.8 (3.5-6.4)	2.9 (1.4-5.4)	8.9 (5.4-13.6)	2.4 (0.2-9.5)[e]	6.8 (4.7-9.6)
12-19	7.8 (5.6-10.5)	7.2 (3.9-11.9)	11.9 (7.3-18.0)	0 ([h]-2.6)	9.3 (6.4-13.0)
Education of household head					
≤High school diploma	7.7 (6.4-9.2)	5.3 (3.5-7.6)	9.1 (5.8-13.4)	1.6 (0.3-4.9)	9.7 (8.0-11.6)
Some college	6.0 (4.5-7.8)	5.1 (3.3-7.4)	7.8 (5.3-11.1)	1.7 (0.1-7.5)[e]	8.4 (5.6-11.9)
College graduate	3.3 (2.2-4.7)	3.4 (2.0-5.3)	5.2 (2.3-9.8)[e]	0.7 (0.1-2.5)	1.8 (0.4-5.4)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Data from the National Health and Nutrition Examination Survey estimates are weighted.

[b] See Table 1 for unweighted sample sizes and eTable 1 in the Supplement for unweighted No. of persons with obesity or severe obesity by age, sex, education of household head, and race and Hispanic origin.

[c] Includes other race and Hispanic origin groups not shown separately.

[d] Obesity was defined as at or above the sex-specific 95th percentile of US Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts.

[e] Estimate potentially unreliable, CI >5 percentage points and relative CI width >130%.

[f] Standard error degrees of freedom <8.

[g] Severe obesity was defined as ≥120% of the sex-specific 95th percentile of CDC BMI-for-age growth charts.

[h] Lower limit of CI could not be calculated.

aged 14 years living in large MSAs was 33.5. These smoothed estimates describe the age patterns and differences between urbanization categories; statistical tests were not performed. Although the 50th percentiles overlapped between urbanization categories until about 10 years, the 95th percentile for non-MSAs was higher than in large MSAs and

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Table 4. Trends in Prevalence of Obesity and Severe Obesity in US Youth Aged 2 to 19 Years by Urbanization, 2001-2004 to 2013-2016[a]

Survey Years	Large MSA		Medium or Small MSA		Non-MSA	
	No. of Participants	% (95% CI)	No. of Participants	% (95% CI)	No. of Participants	% (95% CI)
Obesity[b,c]						
2001-2004	4201	15.3 (14.0-16.7)	2806	15.7 (12.6-19.1)	1211	20.0 (15.7-24.9)
2005-2008	4658	15.8 (13.6-18.3)	1759	14.9 (10.6-20.1)[d]	1033	19.1 (14.8-24.1)
2009-2012	4073	15.3 (13.5-17.2)	1521	20.2 (15.7-25.4)[d]	1167	17.1 (13.3-21.4)
2013-2016	3886	17.1 (14.9-19.5)	2047	17.2 (14.5-20.2)[d]	930	21.7 (16.1-28.1)[d]
P value for trend over time						
Linear		.14		.18		.46
Quadratic		.28		.19		.07
Severe Obesity[e,f]						
2001-2004	4201	4.3 (3.5-5.2)	2806	5.0 (3.7-6.6)	1211	7.3 (4.6-10.8)
2005-2008	4658	4.8 (3.9-5.8)	1759	3.7 (2.3-5.6)[d]	1033	6.8 (3.5-11.6)
2009-2012	4073	4.6 (3.5-5.9)	1521	7.3 (4.1-11.8)[d]	1167	6.1 (4.5-8.0)
2013-2016	3886	5.1 (4.1-6.2)	2047	5.3 (4.3-6.5)[d]	930	9.4 (5.7-14.4)[d]
P value for trend over time						
Linear		.29		.21		.19
Quadratic		.83		.39		.07

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); MSA, metropolitan statistical area.

[a] Data from the National Health and Nutrition Examination Survey, all estimates except sample sizes are weighted; see eTable 2 in the Supplement for unweighted No. of persons with obesity and severe obesity by urbanization and survey period.

[b] Obesity was defined as at or above the sex-specific 95th percentile of US Centers for Disease Control and Prevention (CDC) BMI-for-age growth charts.

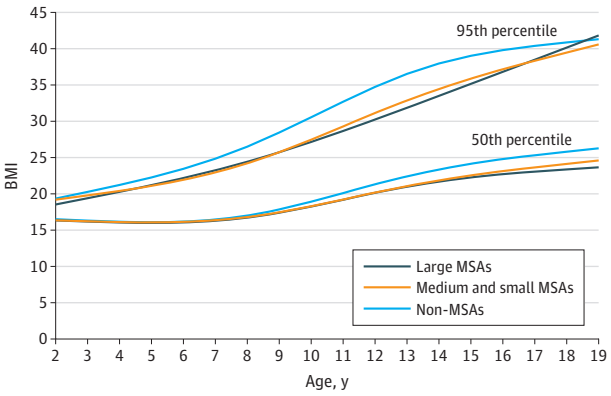
[c] Trend across urbanization all 16 y combined (2001-2016), $P = .006$.

[d] Standard error degrees of freedom <8.

[e] Severe obesity was defined as ≥120% of the sex-specific 95th percentile of CDC BMI-for-age growth charts.

[f] Trend across urbanization all 16 y combined (2001-2016), $P < .001$.

Figure. Smoothed 50th and 95th BMI Percentiles Among US Youth Aged 2 to 19 Years by Urbanization Category and Age, 2013-2016



BMI indicates body mass index (calculated as weight in kilograms divided by height in meters squared); MSA, metropolitan statistical area. Estimates are weighted. Data source: National Health and Nutrition Examination Survey.

medium or small MSAs until age 18 years. This Figure shows different patterns in BMI distribution by urbanization category suggesting the distribution in non-MSAs is more skewed to the right than in other areas and that, starting around age 10 years, the distribution in non-MSAs is also shifted to the right compared with other urbanization categories.

Discussion

In 2013-2016, obesity and severe obesity among US youth was associated with age, race and Hispanic origin, and education of household head. Severe obesity was also inversely associated with urbanization. The association between urbanization and obesity was in the same direction as severe obesity but was not significant. Demographics were not related to the difference by urbanization. In addition, differences in the distribution of BMI among children and adolescents in non-MSAs compared with large and medium or small MSAs suggest that youth in non-MSAs are heavier than those in other areas. Variation by age, race and Hispanic origin, and education of household head is comparable with previous reports.[1]

Recent analyses of health disparities, including obesity, in youth have included analyses based on urbanization.[10] A review of the literature, including 2 studies using NHANES data from 1999-2006 and 2003-2006, reported that obesity prevalence was higher among rural children than among children living in urban areas, and this difference was larger among older children compared with younger children.[6] The current results did not show an interaction between age and urbanization level. In an analysis of 2001-2010 NHANES data, racial differences in weight among US youth were explained entirely by social determinants including neighborhood factors.[7] State-level studies have also found differences by urbanization. A study using school-based BMI from elementary schools in Pennsylvania found differences in

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obesity prevalence by urbanization.[8] Different studies, however, use different categories of urbanization in part because of available sample sizes.

Research in low-income and middle-income countries has also shown differences by urbanization, but in the opposite direction compared with high-income countries. In low-income and middle-income countries, urban areas have had higher levels of BMI but the differences have been attenuated after adjusting for socioeconomic status.[29] These results are in contrast with the current results in which adjustment for socioeconomic status did not change the association between urbanization and obesity. In the current analysis, however, no adjustments were made for measures of socioeconomic status beyond education and the analyses focused on prevalence, not mean BMI.

Trends from 2001-2002 to 2015-2016 were not significant for any urbanization category. The current study investigated trends over a 16-year period beginning in 2001-2002 because 4 years of data were needed to provide estimates by urbanization and 16 years allowed 4 estimates over time. Analysis of overall trends in obesity among youth beginning in 1999-2000 show an increase in prevalence,[2] suggesting changes from 1999-2000 to 2015-2016 have been driven by changes very early in this period. Trends may also vary within subgroups not analyzed in the current study.

The prevalence of severe obesity among US youth was more than 10% in some adolescent subgroups. Research has suggested that youth with severe obesity have a worse cardiovascular disease risk profile than youth with lesser obesity.[18] In one study,[30] severe obesity was associated with higher risk for hypertension compared with lesser obesity. In addition, there was strong tracking over the study period of 2 to 3 years with 72% remaining severely obese at follow-up.

This study has strengths. NHANES is representative of the US civilian, noninstitutionalized population and contains measured weight and height, which result in more accurate estimates of BMI than do self-report or parental report of weight and height.[31,32]

Limitations

This study has several limitations. First, BMI is not a direct measure of adiposity and health risk. Although children with high BMIs are likely to have high levels of adiposity,[33] there are variations by race and Hispanic origin.[34] Adiposity among non-Hispanic black youth is lower than among non-Hispanic white and Mexican American youth at the same BMI level.[34] However, among Asian adults, health risk begins at a lower BMI than in white adults.[35] Differences among youth are not as well described, however. One study found that South Asian youth had higher BMI-adjusted blood pressure than white youth in the United States.[36] The lower prevalence estimates of obesity seen among Asians compared with other race and Hispanic origin groups may not reflect lower disease risk.[37] Second, NHANES is limited by small sample sizes for some subgroups, which restricts the ability to provide estimates by urbanization category for subgroups of the population. Third, NHANES was not designed to provide estimates representative of different urbanization categories or counties, so some cells have low degrees of freedom, which can result in inflated standard errors and reduced statistical power.

Conclusions

In 2013-2016, there were differences in the prevalence of obesity and severe obesity by age, race and Hispanic origin, and household education, and severe obesity was inversely associated with urbanization. Demographics were not related to the urbanization findings.

ARTICLE INFORMATION

Accepted for Publication: April 3, 2018.

Author Contributions: Dr Ogden had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Ogden, Hales.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Ogden.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Fryar, Hales, Carroll, Aoki, Freedman.
Supervision: Ogden.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

Role of the Funder/Sponsor: The National Center for Health Statistics (NCHS) and the US Centers for Disease Control and Prevention (CDC) had a role in the design and conduct of the National Health and Nutrition Examination Surveys and in the collection and management of the data and the clearance of the manuscript; however, the NCHS and the CDC had no role in the preparation of the manuscript; or in the decision to submit the manuscript for publication.

Disclaimer: The findings and conclusions in this report are those of the authors and not necessarily the official position of the CDC.

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Int J Obes (Lond). Author manuscript; available in PMC 2016 June 08.

Published in final edited form as:

Int J Obes (Lond). 2016 April ; 40(4): 639–645. doi:10.1038/ijo.2015.219.

Less Favorable Body Composition and Adipokines in South Asians Compared to Other U.S. Ethnic Groups: Results from the MASALA and MESA Studies

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Abstract

Background—Small studies have shown that South Asians (SAs) have more total body, subcutaneous, visceral and hepatic fat and abnormal adipokine levels compared to Whites. However, comprehensive studies of body composition and adipokines in SAs compared to other ethnic groups are lacking.

Methods—Using harmonized data, we performed a cross-sectional analysis of two community-based cohorts: Mediators of Atherosclerosis of South Asians Living in America (MASALA, n=906) and Multi-Ethnic Study of Atherosclerosis (MESA which included 2,622 Whites; 803 Chinese Americans; 1,893 African Americans; and 1,496 Latinos). General linear models were developed to assess ethnic differences in ectopic fat (visceral, intermuscular, and pericardial fat; and hepatic attenuation), lean muscle mass, and adipokines (adiponectin and resistin). Models were adjusted for age, sex, site, alcohol use, smoking, exercise, education, household income and BMI. Ectopic fat models were additionally adjusted for hypertension, diabetes, HDL, and triglycerides. Adipokine models were adjusted for subcutaneous, visceral, intermuscular, and pericardial fat; and hepatic attenuation.

Results—Compared to all ethnic groups in MESA (Whites, Chinese Americans, African Americans, and Latinos), SAs had greater intermuscular fat (pairwise comparisons to each MESA group, $p < 0.01$), lower hepatic attenuation ($p < 0.001$), and less lean mass ($p < 0.001$). SAs had greater visceral fat compared to Chinese Americans, African Americans and Latinos ($p < 0.05$) and greater pericardial fat compared to African Americans ($p < 0.001$). SAs had lower adiponectin

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Conflict of interest statement: The authors have no conflicts of interest to disclose.

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levels compared to other ethnic groups ($p < 0.01$; except Chinese Americans) and higher resistin levels than all groups ($p < 0.001$), even after adjusting for differences in body composition.

Conclusion—There are significant ethnic differences in ectopic fat, lean mass, and adipokines. A less favorable body composition and adipokine profile in South Asians may partially explain the increased predisposition to cardiometabolic disease. The mechanisms that underlie these differences warrant further investigation.

Introduction

With over 3.4 million current residents, South Asians, individuals from India, Pakistan, Nepal, Bangladesh, and Sri Lanka, comprise the fastest growing ethnic group in the United States (US) (1). Compared to other race/ethnic groups, South Asians have higher rates of type 2 diabetes (DM) (2) and cardiovascular disease (CVD) (3, 4). Some hypothesize that the higher rates of metabolic disorders and CVD are due to differences in body composition with higher amounts of fat in organs and tissues where fat is not intended to be stored (called ectopic fat) and/or lower levels of lean muscle mass (5).

Compared to Whites, South Asians have higher amounts of total body fat for a given body mass index (BMI) (6). Abnormalities in glucose and lipid metabolism that are seen in Europeans with a BMI of 30 kg/m^2 are seen at a lower BMI (21-22.5 kg/m^2) in South Asians (7). Furthermore, for a given level of total body fat, South Asians have higher amounts of abdominal adipose tissue including subcutaneous, visceral and hepatic fat, and less lean muscle mass (8, 9), as well as abnormal levels of hormones secreted from adipose tissue (adipokines) (10, 11). Compared to Whites, South Asians have a lower capacity to store fat in subcutaneous adipose, and therefore, some have proposed the adipose tissue overflow hypothesis, which states that excess fat overflows to these ectopic compartments (12). In the Molecular Study of Health and Risk in Ethnic Groups (mol-SHARE), ectopic fat in combination with decreased lean muscle mass and an abnormal adipokine profile was associated with insulin resistance and higher cardiometabolic risk in South Asians with a non-obese BMI (9).

Prior studies investigating differences in body composition, ectopic fat depots, and adipokines in South Asians compared to another ethnic group have been small. None have performed a comprehensive evaluation of several ectopic fat depots, lean muscle mass and adipokines simultaneously among multiple different race/ethnic groups. A comprehensive evaluation of body composition that includes several measures of ectopic fat and lean mass in combination with adipokine levels, serving as measures of adipocyte dysfunction, is critical to better assessing overall metabolic risk in the South Asian population. Therefore, using data from two large well-phenotyped cohorts, Mediators of Atherosclerosis in South Asians Living in America (MASALA) and Multi-Ethnic Study of Atherosclerosis (MESA), we compared body composition and adipokines amongst five race/ethnic groups. Our hypothesis was that compared to other race/ethnic groups in the US, South Asians would have greater amounts of ectopic fat (visceral fat area, intermuscular fat area, pericardial fat volume and lower hepatic attenuation), less lean muscle mass and a less favorable adipokine profile. Additionally, we hypothesized that by controlling for the differences in body

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composition, we would be able to explain the differences in adipokine levels between South Asians and the other four race/ethnic groups.

Methods

Study Populations

We performed a cross-sectional analysis of harmonized data from two community-based cohorts: MASALA and MESA. Since we did not detect a strong correlation between age and body composition variables ($r \leq 0.35$), all individuals in the MASALA study (ages 40-84 years) were included for the purposes of this analysis (n=906) and were compared to the four MESA racial/ethnic groups. Data from the MESA baseline exam was used for pericardial fat volume and hepatic attenuation analyses and included 2,622 Whites, 803 Chinese Americans, 1,893 African Americans, and 1,496 Latinos. Data from an ancillary study from MESA Exams 2 and 3 was used for abdominal fat, intermuscular fat, lean mass and adipokine analyses, which included a random sample from each of the four race/ethnic groups with a total of 785 Whites, 251 Chinese Americans, 407 African Americans, and 501 Latinos.

The institutional review boards at the sites conducting both the MASALA and MESA studies approved both study protocols. Informed consent was obtained from all study subjects.

MASALA Study

The MASALA study is a community-based cohort of South Asian adults without known CVD, which was modeled on MESA (13, [14]). Study participants were sampled from two geographic locations, the nine counties of the San Francisco Bay Area and the greater Chicago area. Clinical sites for the study were at the University of California, San Francisco (UCSF) and Northwestern University (NWU). A total of 906 subjects were recruited between October 2010 and March 2013. We have previously published detailed methods for the MASALA Study (14).

Eligibility criteria for MASALA included self-identification of South Asian ethnicity, age between 40-84 years, and ability to speak and read English, Hindi or Urdu. (14). MASALA used identical exclusion criteria as the MESA Study which included a diagnosis of a heart attack, stroke or transient ischemic attack, heart failure, angina, nitroglycerin medication use, any prior cardiovascular procedures, current atrial fibrillation, cancer treatment, shortened life expectancy, impaired cognition, plans to move out of the geographic vicinity of the study site in the next 5 years, living in a nursing home, or weight >300 lbs. (14).

Participants were assisted by trained bilingual study staff to complete detailed questionnaires for demographic information and behaviors (including tobacco and alcohol use) (14). Physical activity was assessed using the Typical Week's Physical Activity Questionnaire (15).

Blood pressure was measured after a 5 minute seated rest using an automated blood pressure machine (V100 Vital Sign Monitor; GE Healthcare, Fairfield, CT, USA). Three blood

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pressures were recorded and the average of the last two readings used as mean systolic and diastolic blood pressure. A systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg or use of any anti-hypertensive medication was used to define hypertension.

After a requested 12 hour fast, fasting blood samples were obtained. We measured total cholesterol, triglycerides, high-density lipoprotein cholesterol using enzymatic methods and low density lipoprotein was calculated. Fasting plasma glucose was measured by hexokinase method (Quest Labs, San Jose, CA). We used the American Diabetes Association criteria to define diabetes, by fasting glucose ≥126 mg/dl and/or use of a diabetes medication. We measured adiponectin and resistin using Millipore Luminex adipokine A panel (EMD Millipore; Billerica, MA). Inter-assay coefficient of variation was 2.3-4.1% for adiponectin and 3.3-5.5% for resistin.

Body Composition—We measured participant weight on a standard balance-beam scale or digital weighing scale. Height was measured using a stadiometer. BMI was calculated by weight in kg divided by height in $(\text{meters})^2$. Trained study coordinators measured waist circumference using a flexible tape measure at the site of maximum waist circumference midway between the lower ribs and the anterior superior iliac spine. The average of two measurements was used for analysis.

Computed tomography scans of the abdomen (CT, Philips Medical Systems, Andover, MA, USA; Toshiba Medical Systems, Tustin, CA, USA; Siemens Medical Solution, Malvern, PA, USA) were used to calculate abdominal visceral and subcutaneous fat area intermuscular fat area, and abdominal lean muscle mass area. A CT technician obtained a lateral scout image of the abdomen to establish position between the L4 and L5 vertebrae. A single abdominal CT slice was obtained at this level and Medical Image Processing, Analysis, and Visualization (MIPAV) software was used to measure visceral and subcutaneous abdominal fat (17) at the University of California, San Diego body composition reading center. Visceral fat was demarcated by readers as those pixels with the appropriate Hounsfield Unit (HU) range inside the visceral cavity. Subcutaneous fat was defined as the tissue outside the visceral cavity but inside the body contour. Muscle segmentation was done as previously described (18). The four abdominal/back muscle groups from which fat and lean mass measurements were obtained included the psoas, paraspinous, oblique and rectus muscles. These muscles were highlighted by the readers and then deleted from the calculation of subcutaneous fat. Measurements from all four abdominal and back muscle groups were summed to obtain total intermuscular fat area and total lean muscle mass area.

Non-contrast cardiac CT images were obtained to quantify pericardial fat and hepatic attenuation using a cardiac-gated CT scanner: at UCSF, a Phillips 16D scanner or a Toshiba MSD Aquilion 64 and at NWU, a Siemens Sensation Cardiac 64 Scanner (Siemens Medical Solutions, Malvern, PA, USA) was used. The same reading center staff under the supervision of Dr. Jeffrey Carr performed all measurements of pericardial fat volume and hepatic attenuation. The CT scan range encompassed the entire heart and provided information on 45 mm of adipose tissue encasing the proximal coronary arteries. We first defined the 45 mm z-axis volume containing the proximal coronary arteries. The technician

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follows a set of regions of interest (ROI) pertaining to subcutaneous and pericardial fat within the 45 mm volume along with regions in the calibration phantom to calculate the range of Hounsfield units (HU) for adipose tissue. The technician segments the heart from the thorax by removing tissues beyond the lung using a deformable model-based edge detection method such as active contours or live wires to detect the boundary between the lung and fat around the heart (19-21).

CT images for hepatic attenuation were also interrogated using the MIPAV software at vertebral level T12-L1. Nine ROIs within homogenous portions of the liver at two levels were read, avoiding any vascular structures or other liver pathology. Measurement methods were similar to those used in MESA (22). Fatty liver was defined as having Hounsfield units < 40.

MESA Study

The study design, eligibility, and methods for MESA have been previously published (13). MESA includes individuals from four racial/ethnic groups (Whites, African Americans, Chinese Americans, and Latinos)living in Forsyth County, North Carolina; Chicago, Illinois; Baltimore, Maryland; Los Angeles County, California; St. Paul, Minnesota; and New York, New York. Data from the baseline MESA examination (2000-2002) were used for hepatic attenuation and pericardial fat volume measurements; data from a body composition ancillary study done during exam 2 (2002-2004) and 3 (2004-2005) were used for the abdominal fat, intermuscular fat, lean mass, and adipokine measurements. Identical questionnaires for assessing sociodemographic characteristics and behaviors and identical protocols for seated blood pressure, anthropometry, and abdominal and cardiac CT scanning were used as described above for the MASALA study. Both studies used the same reading centers and protocols for measuring abdominal body composition, pericardial fat volume and hepatic attenuationfor ease of data harmonization.

Serum glucose was measured from fasting samples by the glucose oxidase method (Ortho Clinical Diagnostics, Johnson & Johnson). Similar assays were used to measure adiponectin and resistin (Millipore Luminex adipokine panel A) as for the MASALA study, and these adipokines measurement were conducted at the same research laboratory.

Statistical Analysis

Harmonized data from the MASALA and MESA study cohorts was used. Age- and sex-adjusted baseline characteristics of the MASALA participants and each of the MESA race/ethnic groups were obtained using regression standardization.

Multivariate general linear models were developed to examine the association between race/ethnicity and the following: subcutaneous fat area, visceral fat area, total intermuscular fat area, pericardial fat volume, hepatic attenuation, total lean muscle mass area, adiponectin and resistin. For the body fat measures, the models were adjusted in a stepwise manner: first for age, sex, site, alcohol use, smoking history, education, household income, exercise and BMI; then for hypertension and DM; and finally for HDL and triglycerides. The total lean muscle mass model and adipokine models were adjusted for age, sex, site, alcohol use, smoking history, education, household income, exercise, and BMI. The adipokine models

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were additionally adjusted for visceral fat area, total intermuscular fat area, subcutaneous fat area, pericardial fat volume, and hepatic attenuation. Additionally, to account for race/ethnic differences in height, a sensitivity analysis was done where the models were adjusted for height instead of BMI. Sex interaction by race was also investigated and sex-stratified analyses were also done. For the pericardial fat volume and hepatic attenuation models, baseline covariate data from the MESA study was used for sequential adjustments. For the abdominal fat, intermuscular fat, lean mass, and adipokine models, updated MESA covariate data from exam 2 and 3 were used for sequential adjustments.

All analyses were conducted using SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA).

Results

South Asians in MASALA were younger (55±9 years for MASALA vs. 62±10 years in MESA) and MASALA included fewer women (46% women in MASALA vs. 52% in MESA) compared to those in other race/ethnic groups in MESA. Therefore age- and sex adjusted baseline characteristics of participants in the MASALA and MESA studies by race/ethnic group are shown in Table 1. Compared to other MESA groups, South Asians had a significantly higher level of education, higher household income, lower prevalence of smoking and alcohol use (except compared to Chinese Americans), and were less physically active. South Asians also had a higher prevalence of DM and hypertension (except compared to African Americans), lower adiponectin levels and higher resistin levels. South Asians had a lower BMI, weight and waist circumference compared to most other MESA groups, except compared to Chinese Americans who had the lowest means for these anthropometric indices.

Figure 1a-e (and Supplemental Table 1) depict the mean ectopic fat measures after adjusting for age, sex, socioeconomic status, behavioral factors, BMI, and metabolic factors (DM, hypertension, HDL and triglycerides). Compared to African Americans, South Asians had less subcutaneous fat. South Asians had higher levels of visceral fat compared to Chinese Americans, African Americans, and Latinos but similar amounts compared to Whites. South Asians had higher levels of intermuscular fat and hepatic fat (ie lower hepatic attenuation) compared to all other race/ethnic groups. South Asians had less pericardial fat volume compared to Whites and Chinese Americans, but greater pericardial fat volume than African Americans. Pericardial fat volume was similar between South Asians and Latinos.

Analyses of lean muscle mass, adjusting for age, sex, socioeconomic status, behavioral factors, and BMI showed that South Asians had significantly less total lean abdominal/back muscle mass compared to all other ethnic groups after full adjustment (Figure 1f and Supplemental Table 1).

Adiponectin levels were lower in South Asians after adjusting for age, sex, socioeconomic status, behavioral factors, BMI and all ectopic fat measures compared to all MESA groups except for Chinese Americans. However, resistin levels remained higher in South Asians compared to all other ethnic groups after full adjustment for all ectopic fat depots (Figure 2 and Supplemental Table 1).

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In order to adjust for body size differences without possibly overadjusting for fat or lean body mass, we performed a sensitivity analysis adjusting for height instead of BMI (Supplemental table 2). Similar results were obtained for the analyses of lean mass, adipokines and hepatic attenuation and only some slight but statistically significant differences were noted in the other ectopic fat measures.

Given evidence of sex interaction by race for several of the ectopic fat measures and adipokines, sex-stratified analyses were performed (Supplemental table 3). With few exceptions, body composition and adipokine patterns across ethnicities were similar in men and women, although similar levels of significance were not always observed.

Discussion

In this cross-sectional study of two community-based cohort studies of multiple ethnic groups residing in the US and without cardiovascular disease, South Asians overall had less favorable body composition and adipokine profiles compared to most other US race/ethnic groups. Interestingly, while South Asians did not consistently have higher levels of subcutaneous and visceral fat area compared to other race/ethnic groups, they had greater total intermuscular fat area, lower hepatic attenuation and less total lean muscle mass compared to all other ethnic groups. Furthermore, even after adjusting for all measures of ectopic fat, South Asians had lower adiponectin levels compared to all other ethnic groups, except Chinese Americans, and higher resistin levels compared to all other groups.

The prevalence of obesity-related diseases such as DM, hypertension, and coronary artery disease is high in South Asians (23). A recent comparison of the MASALA and MESA cohorts found that US South Asians have a higher prevalence of diabetes compared to other ethnic groups (2). In the MASALA pilot study, we showed that while South Asians only had a modestly elevated BMI (mean 26.1 kg/m^2), they had relatively high levels of total and regional adiposity, including subcutaneous, visceral and hepatic fat (24). Studies in South Asians have demonstrated that visceral adiposity is associated with insulin resistance (IR), increased inflammatory markers, the metabolic syndrome and cardiovascular risk (25, 26). Therefore, it is thought that despite having a non-obese BMI, having greater amounts of ectopic fat contributes to an increased risk of obesity-related diseases in South Asians (23).

While our findings show that there are some race/ethnic differences in visceral and subcutaneous fat, our observations differ from what has been reported in other South Asian studies conducted in Europe and Canada. The M-CHAT study found that compared to Europeans, South Asians had greater amounts of subcutaneous adipose tissue (SAT) and visceral adipose tissue (VAT) for a given amount of total body fat, although at extremely high values of body fat mass, no differences were detected (8). South Asian men and women also had greater total body fat and abdominal fat for a given BMI compared to Europeans and Pacific Islanders (27). And differences in metabolic risk factors were explained by greater VAT in South Asians compared to Europeans (28). Some studies conducted in the US have also found that compared to Whites, Asian Indians have higher levels of SAT and VAT for a given BMI (29, 30). Our findings may differ from prior studies due to differences

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in age and socioeconomic, immigration and behavioral differences between South Asians and Whites in the US vs. those in Europe or Canada.

Ectopic fat stores including intermuscular fat, hepatic fat, and pericardial fat are also important for cardiometabolic risk. Intermuscular adipose tissue is implicated in metabolic dysfunction and IR (31). We found that South Asians had the highest total intermuscular fat area compared to all other groups. Only one other study has investigated differences in intermuscular fat between South Asians and other ethnic groups and found that South Asians had less or similar amounts of thigh intermuscular fat compared to Europeans (32). Since we measured abdominal front and back wall intermuscular fat, these findings are not directly comparable to our findings.

Non-alcoholic fatty liver disease (NAFLD) is associated with several features of the metabolic syndrome in South Asians (33). We found that South Asians had lower hepatic attenuation (greater hepatic fat content) compared to all other ethnic groups. There are few studies comparing liver attenuation in South Asians to other ethnic groups. The mol-SHARE study found that South Asians had more liver fat than Caucasians (9). However, this ethnic difference was attenuated after adjustment for adipocyte size and fat distribution (9). Studies evaluating other ethnic groups, including prior studies of the MESA cohort, have found that compared to Whites, Hispanics had a higher odds and African Americans had a lower odds of fatty liver (22, [34]). These race/ethnic differences are thought to be due to differences in lifestyle, insulin resistance, genetics, and distribution of adiposity (34).

Interestingly, we found that South Asians had less or similar pericardial fat volume compared to all ethnic groups except African Americans. To our knowledge, this is the first study to investigate pericardial fat in South Asians. Pericardial fat is associated with obesity–related insulin resistance (35), which has also been shown in the MESA cohort (36). Ongoing investigations will examine pericardial fat associations with metabolic and CVD outcomes in the MASALA cohort.

While increased adiposity increases the risk of metabolic disorders and CVD, lower lean mass also plays a role. Since lean mass is predominantly skeletal muscle mass, a target for insulin action, higher levels of lean mass are associated with greater insulin sensitivity (37) and reduced muscle mass has been associated with decreased insulin sensitivity in Asian Indian men (23). We found that South Asians had the lowest total lean mass area compared to all other ethnic groups. These findings are consistent with those from prior studies (27, [29], [38]), including the mol-SHARE study, which found that South Asian men and women had less total body lean mass compared to Caucasians (9). Why South Asians have less lean muscle mass than other race/ethnic groups and understanding the role of physical activity, the biology of lean muscle mass and its role in metabolic risk are key areas for future investigation.

Adipokines are associated with metabolic risk as low levels of adiponectin and high levels of resistin have been implicated in insulin resistance and obesity (39, [40]). We found that adiponectin was lower in South Asians compared to Whites, African Americans and Latinos while resistin was higher in South Asians compared to all other groups. These findings are

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consistent with those from prior studies (41-43). The mol-SHARE study found that South Asians had lower adiponectin levels than Whites, although this difference was accounted for by increased adipocyte area in South Asians versus Whites (9). To our knowledge, other studies comparing resistin levels between South Asians and other ethnic groups have not been conducted. We expected that accounting for differences in body composition would explain the differences in adipokine levels between South Asians vs. other groups, however, the differences remained significant. The robust differences in these adipokine levels among South Asians suggest that adipokines may independently influence downstream metabolic risk.

This study has several strengths as it is the first study to perform a comprehensive analysis of body composition and adipokines among five ethnic groups in the US using data from two large cohorts with harmonized data. In addition, it includes several radiographic measures of body composition including novel measures of ectopic fat. Limitations include inability to adjust for comparable measures of dietary intake between the two cohorts to determine the role of diet in body composition differences although measures of socioeconomic status may serve as a surrogate for diet. In addition, the prevalence of obesity in 2000-2005 during the MESA data collection and 2010-2013 for the MASALA data collection may be different and may have introduced some differences between the two cohorts. Finally, while the MASALA Study does not include a nationally representative sample of South Asians, it is representative of the middle-older aged South Asian population in the US. However, our findings may not be generalizable to the younger US South Asian population or to South Asians in other diaspora settings.

In conclusion, US South Asians have high levels of intermuscular and hepatic fat, less lean muscle mass and less favorable adipokine profiles compared to other US race/ethnic groups. These differences may partially account for the increased predisposition to insulin resistance, metabolic disorders and diabetes in South Asians. Prospective follow-up of the MASALA study cohort will provide additional insight into how these ethnic differences in body composition and adipokines influence differences in the development of type 2 diabetes and cardiovascular disease.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors thank the other investigators, the staff, and the participants of the MASALA and MESA studies for their valuable contributions. A full list of participating MESA investigators and institutions can be found at http://www.mesa-nhlbi.org.

Funding: The MASALA study was supported by the NIH grant no.1R01 HL093009 and K24HL112827. Data collection at UCSF was supported by NIH/NCRR UCSF-CTSI Grant Number UL1 RR024131.Dr. Shah was supported by NIH grant 5T32DK007418-34, the Wilsey Family Foundation and the Cliff Lede Family Foundation. The MESA study was funded by contracts N01-HC-95159, N01-HC-95160, N01-HC-95161, N01-HC-95162, N01-HC-95163, N01-HC-95164, N01-HC-95165, N01-HC-95166, N01-HC-95167, N01-HC-95168 and N01-HC-95169 from the National Heart, Lung, and Blood Institute and by grants UL1-TR-000040 and UL1-TR-001079 from NCRR. The pericardial fat and hepatic attenuation measurements for MESA were supported by NIH grant 5RO1HL085323-04. The MESA Body Composition, Inflammation and Cardiovascular Disease Ancillary Study

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was supported by NIH grant RO1-HL088451. The sponsors for both studies did not play a significant role in the analysis, interpretation, and presentation of these results.

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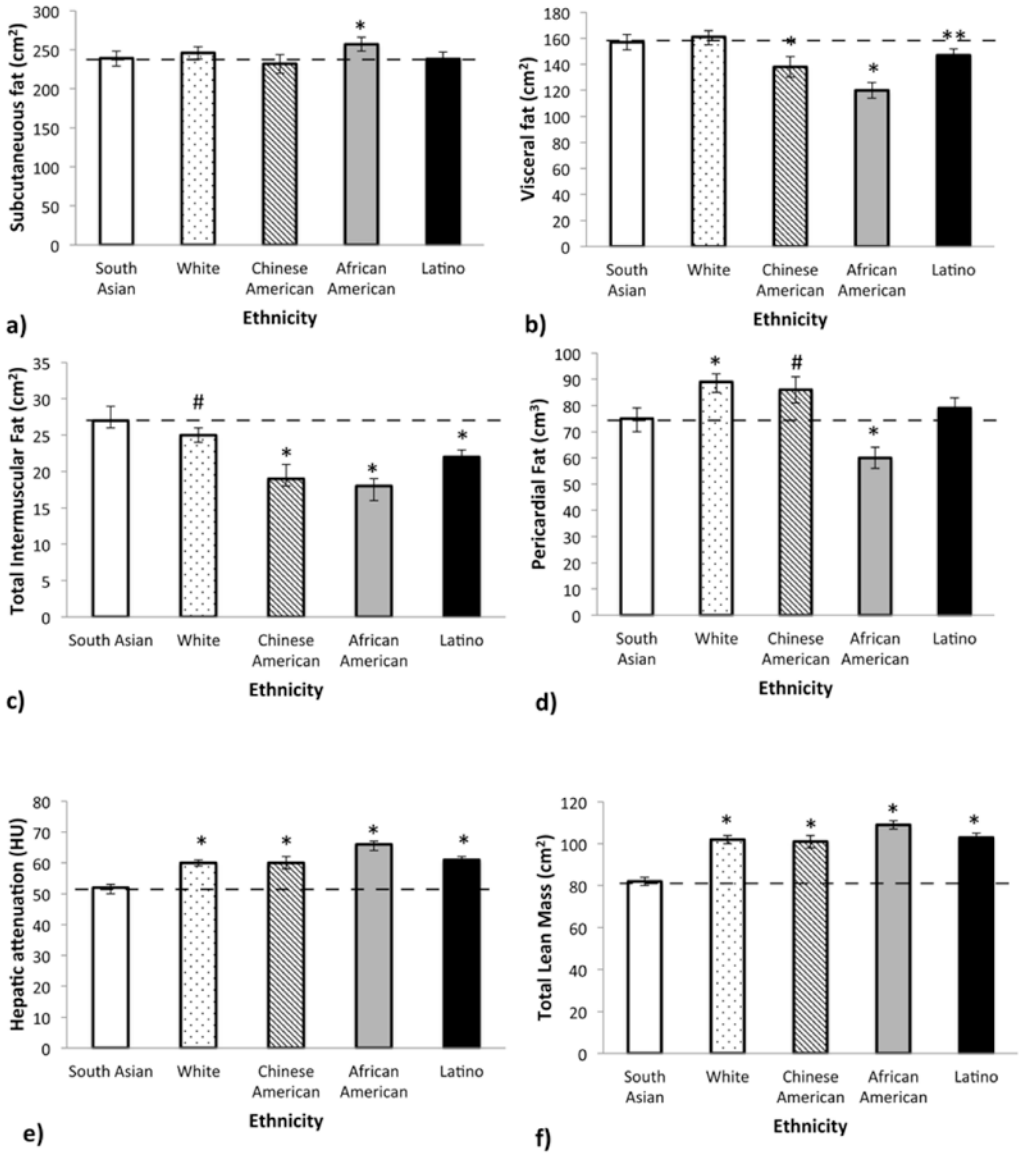


Figure 1. (A-F): Fully-Adjusted Body Composition Measures Across Ethnic Groups

Body composition was compared across ethnic groups in a multivariate model. Covariates included: age, sex, study site, alcohol use, smoking history, socioeconomic status, exercise and BMI. For abdominal and ectopic fat measures, additional covariates included: diabetes, hypertension, HDL, and triglycerides. Data represent mean and 95% confidence interval. (A – Subcutaneous fat area, B – Visceral fat area, C – Total intermuscular fat area, D – Pericardial fat volume, E – Hepatic attenuation, F – Total lean muscle mass area.)

For pericardial fat and hepatic attenuation analyses, N for MESA ethnic groups are as follows: White – 2622, Chinese American – 803, African American – 1893, and Latino – 1496. For subcutaneous fat area, visceral fat area, total intermuscular fat area, and total lean muscle mass area analyses, N for MESA ethnic groups are as follows: Whites – 785, Chinese Americans – 251, African Americans – 407, and Latino – 501.

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*p < 0.001: Results of pairwise comparisons of body composition between South Asians and each of the other race / ethnic groups.

**p < 0.05: Results of pairwise comparisons of body composition between South Asians and each of the other race / ethnic groups.

#p < 0.01: Results of pairwise comparisons of body composition between South Asians and each of the other race / ethnic groups.

Abbreviations: BMI – body mass index, HDL – high-density lipoprotein, HU – Hounsfield units.

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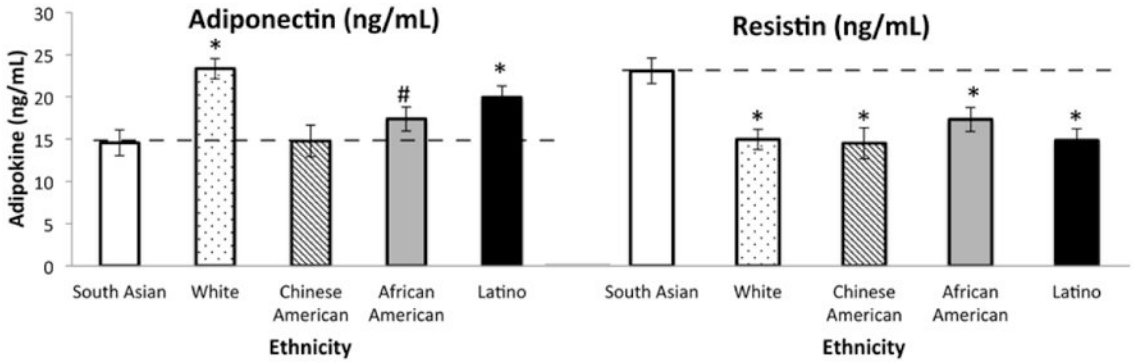


Figure 2. Fully-Adjusted Adipokine Levels Across Ethnic Groups

Left: Adiponectin (ng/mL)

Right: Resistin (ng/mL)

Adipokine levels were compared across ethnic groups in a multivariate model. Covariates included: age, sex, study site, alcohol use, smoking history, socioeconomic status, exercise, BMI, subcutaneous fat area, visceral fat area, total intermuscular fat area, pericardial fat volume and hepatic attenuation. Data represent mean and 95% confidence interval.

For these analyses, N for MESA ethnic groups are as follows: Whites – 785, Chinese Americans – 251, African Americans – 407, and Latino – 501.

*$p < 0.001$: Results of pairwise comparisons of adipokine levels (adiponectin and resistin) between South Asians and each of the other race / ethnic groups.

$^{\#}p < 0.01$: Results of pairwise comparisons of body composition between South Asians and each of the other race / ethnic groups.

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Int J Obes (Lond). Author manuscript; available in PMC 2016 June 08.

Table 1

Age- and Sex-Adjusted Baseline characteristics* of MASALA and MESA# study participants by race/ethnicity

Characteristics	South Asian (n=906)	White (n=2622)	p-value	Chinese American (n=803)	p-value	African American (n=1893)	p-value	Latino (n=1496)	p-value	Overall p-value
Socioeconomic Status										
Education (≥Bachelor's degree)	85 (83-88)	50 (49-52)	< 0.001	39 (36-43)	< 0.001	35 (33-37)	< 0.001	10 (8-11)	< 0.001	< 0.001
Household Income(≥ $75,000)	66 (63-69)	37 (35-39)	< 0.001	17 (15-20)	< 0.001	17 (15-18)	< 0.001	7 (6-8)	< 0.001	< 0.001
Behavioral Factors										
Ever smoker	17 (14-19)	56 (54-58)	< 0.001	25 (22-28)	< 0.001	55 (53-58)	< 0.001	46 (44-48)	< 0.001	< 0.001
Alcohol (≥ 1 drink/week)	31 (28-33)	65 (63-66)	< 0.001	21 (19-24)	< 0.001	53 (51-55)	< 0.001	47 (44-49)	< 0.001	< 0.001
Exercise (MET-min/week)	1246 (95)	2646 (55)	< 0.001	1780 (99)	< 0.001	2747 (64)	< 0.001	2107 (72)	< 0.001	< 0.001
Clinical and Metabolic Factors										
Systolic blood pressure (mmHg)	129.3 (0.7)	122.5 (0.4)	< 0.001	123.8 (0.7)	< 0.001	131.0 (0.4)	0.03	126.7 (0.5)	0.002	< 0.001
Diastolic blood pressure (mmHg)	72.9 (0.3)	70.3 (0.2)	< 0.001	72.0 (0.3)	0.06	74.7 (0.2)	< 0.001	71.5 (0.2)	0.001	< 0.001
Hypertension	51 (48-54)	37 (35-38)	< 0.001	36 (33-39)	< 0.001	58 (56-60)	< 0.001	42 (39-44)	< 0.001	< 0.001
Fasting glucose (mmol/L)	5.79 (0.06)	5.01 (0.03)	< 0.001	5.43 (0.06)	< 0.001	5.50 (0.04)	< 0.001	5.71 (0.04)	0.22	< 0.001
Diabetes	24 (21-28)	6 (5-7)	< 0.001	13 (10-15)	< 0.001	17 (16-19)	< 0.001	18 (16-20)	< 0.001	< 0.001
Total cholesterol (mmol/L)	4.86 (0.03)	5.06 (0.02)	< 0.001	4.99 (0.03)	0.004	4.89 (0.02)	0.33	5.12 (0.02)	< 0.001	< 0.001
LDL-cholesterol (mmol/L)	2.86 (0.03)	3.03 (0.02)	< 0.001	2.98 (0.03)	0.002	3.01 (0.02)	< 0.001	3.09 (0.02)	< 0.001	< 0.001
HDL-cholesterol (mmol/L)	1.33 (0.01)	1.35 (0.01)	0.23	1.28 (0.01)	0.002	1.34 (0.01)	0.40	1.23 (0.01)	< 0.001	< 0.001
Triglycerides (mmol/L)	1.47 (0.03)	1.50 (0.02)	0.31	1.61 (0.03)	0.002	1.19 (0.02)	< 0.001	1.77 (0.02)	< 0.001	< 0.001
Adiponectin (ng/mL)	12.8 (0.4)	23.5 (0.4)	< 0.001	16.6 (0.7)	< 0.001	17.3 (0.5)	< 0.001	19.4 (0.5)	< 0.001	< 0.001
Resistin (ng/mL)	22.4 (0.3)	15.7 (0.3)	< 0.001	14.9 (0.6)	< 0.001	17.7 (0.5)	< 0.001	16.0 (0.4)	< 0.001	< 0.001
Anthropometric Measures										
Body mass index (kg/m^2)	25.8 (0.2)	27.8 (0.1)	< 0.001	24.0 (0.2)	< 0.001	30.2 (0.1)	< 0.001	29.4 (0.1)	< 0.001	< 0.001
Weight (kg)	67.9 (0.5)	79.5 (0.3)	< 0.001	63.0 (0.6)	< 0.001	85.9 (0.4)	< 0.001	77.5 (0.4)	< 0.001	< 0.001
Height (cm)	162.4 (0.2)	169.1 (0.1)	< 0.001	161.6 (0.2)	0.01	168.9 (0.1)	< 0.001	161.8 (0.2)	0.04	< 0.001
Waist circumference (cm)	93.2 (0.5)	97.9 (0.3)	< 0.001	87.0 (0.5)	< 0.001	101.2 (0.3)	< 0.001	100.6 (0.3)	< 0.001	< 0.001

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[*] Data are presented as percent (95% confidence interval) or mean (standard error). Using South Asians as the reference group, pairwise comparisons were done using logistic model and analysis-of-variance (ANOVA).

[#] Analyses done using data from baseline exam

Abbreviations: MET (metabolic equivalent), LDL (low-density lipoprotein), HDL (high-density lipoprotein)

Creating Equal Health Opportunity: How the Medical Civil Rights Movement and the Johnson Administration Desegregated U.S. Hospitals

Vanessa Burrows and Barbara Berney

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"It used to be," President Lyndon B. Johnson noted in 1966,

> in many places in our land, that a sick man whose skin was dark was not only a second-class citizen, but a second-class patient. He went to the other door, he went to the other waiting room, he even went to the other hospital. . . . Under this administration's Medicare program, the hospital has only one waiting room, it has only one standard for black and white and brown, for all races, for all religions, for all faiths, for all regions. And I think that is a victory for all of us; that is a victory for America. The day of second-class treatment, the day of the second-class patrient is gone . . . good medical attention is the right of every American citizen.[1]

Medicare revolutionized U.S. health care. By minimizing the burden of medical expenses for patients, it dramatically improved access and quality of care for millions of elderly Americans. And by attaching health benefits to senior citizenship, it made health care a basic civil right. But, often unrecognized is that Medicare also transformed health care by rooting out racial segregation in hospitals. Medicare was designed to pay for care for virtually every U.S. resident over the age of sixty-five, and, since older people get sick in disproportionate numbers—and before Medicare were largely uninsured—Medicare promised to represent about one-third of hospitals' revenue and approximately 10 percent of health care expenses nationwide.[2]

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The authors would like to thank David Barton Smith for his expertise and support, the interviewees who shared their personal experiences in the oral history research documented in this paper, and the sponsors who made this research possible: the National Endowment for the Humanities and the Robert Wood Johnson Foundation President's Grant Fund of the Princeton Area Community Foundation.

[1] Lyndon Baines Johnson, "Remarks at the Dedication of the Ellenville Community Hospital, Ellenville, New York," Aug. 19, 1966, *American Presidency Project,* http://www.presidency.ucsb.edu/ws/?pid=27787.

[2] Peter Libassi interview by Barbara Berney, Feb. 23, 2012, digital film (in Barbara Berney's possession); Wilbur J. Cohen, "Medicare—A Five-Month Progress Report," *Journal of the National Medical Association,* 58 (Jan. 1966), 73–77, esp. 74. Vanessa Burrows and Barbara Berney collected many of the oral histories referenced in this article for their documentary *Power to Heal.* See *Power to Heal,* http://www.blbfilmproductions.com.

doi: 10.1093jahist/jaz004
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Hospitals could not afford to turn it down. To be certified as eligible to receive Medicare payments, hospitals had to meet both health and safety and civil rights rules. These protocols set new standards for all participating hospitals. At this critical point in the development of the U.S. health care system, Johnson's administration enforced a national standard for equal health opportunity, making certain that before hospitals would be eligible to receive Medicare funds they would have to demonstrate compliance with the nondiscrimination standards of Title VI of the Civil Rights Act of 1964, which prohibited discrimination against patients or staff in any part of a medical facility. This insistence on nondiscriminatory hospital care as a pillar of the Great Society's expanded social safety net brought lifesaving medical care to millions of African Americans of all ages, and represented a monumental victory in health equity and racial justice.[3]

Yet the desegregation of American hospitals is not often seen as an accomplishment of the civil rights movement, nor is Medicare often remembered as a civil rights initiative. Unlike the drawn-out, widely publicized struggles over education, accommodations, and voting rights, the desegregation of hospitals under Medicare was quick and efficient. Ironically, because hospital desegregation aroused less media attention and political controversy, its vital contribution to civil rights advancement was obscured. More importantly, hospital desegregation is seldom remembered in the history of the civil rights movement, not simply because of its deft execution but because it does not fit the discursive categories of civil rights historiography and public memory. Hospital desegregation did not mobilize large public demonstrations, and it was not met with the massive resistance characteristic of other civil rights initiatives. It defies the customary periodization of the civil rights movement that celebrates the Civil Rights Act of 1964 and the Voting Rights Act of 1965 as the final victories of a decade-long struggle. Though the movement to desegregate hospitals does not conform to familiar paradigms of civil rights activism, it was an indisputable victory against a violent and inhumane pillar of Jim Crow America. Reckoning with the history of hospital desegregation helps us explore the character and meaning of the civil rights movement and its relationship with the federal government.[4]

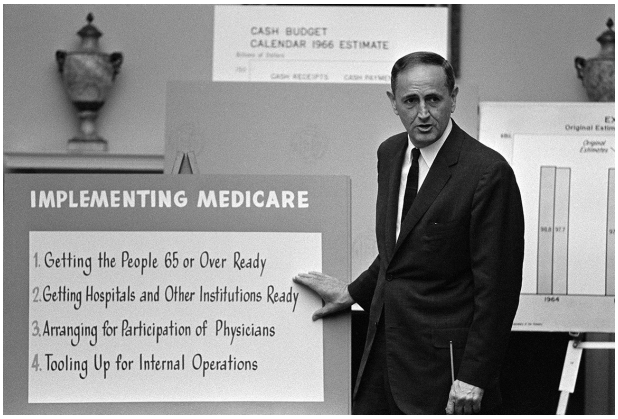
Hospital desegregation was achieved through a productive collaboration among civil rights activists, medical and legal professionals and organizations, and members of different branches of the federal government. The research of P. Preston Reynolds, Jill Quadagno, John Dittmer, and David Barton Smith, has brought to light the dedicated activism of four major groups: the black medical community, grassroots civil rights workers, national civil rights advocacy organizations, and the federal government. Reynolds has created a body of scholarship that charts advancements in legal advocacy and federal policy to achieve hospital desegregation, focusing on the casework of the National Association for the Advancement of Colored People's Legal Defense and Educational Fund (LDF) and bureaucratic action within the Department of Health, Education, and Welfare (HEW). Quadagno employs power resource theory analysis in a similar focus on law and federal policy to show how discriminatory policies born of the private sector were enshrined in the public sector through federal hospital construction policy, which she holds up as a parable of the potential of the welfare state to either "reproduce forms of oppression [or] be a vehicle of liberation."[5]

[3] Civil Rights Act of 1964, sec. 601–5, 78 Stat. 252 (1964).

[4] *Ibid.* Voting Rights Act of 1965, 79 Stat. 437 (1965).

[5] P. Preston Reynolds, "Professional and Hospital Discrimination and the U.S. Court of Appeals Fourth Circuit, 1956–1967," *American Journal of Public Health,* 94 (May 2004), 710–20. P. Preston Reynolds, "The Federal Gov-

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In this photo from June 1, 1966, Secretary of Health Education and Welfare John Gardner explains preparations for the roll-out of Medicare at a cabinet meeting. *Courtesy Lyndon Baines Johnson Library and Museum, Austin, Tex.*

While these studies illuminate our understanding of the federal-level struggle to desegregate hospitals, they do not reveal the enormous importance of civil rights activists in catalyzing federal action and crafting policy. John Dittmer helps close this gap with his history of the Medical Committee for Human Rights (MCHR) and its work with both civil rights organizations and federal agencies, but he portrays the federal government as a distant, disconnected, and sometimes-obstructive actor in the movement to desegregate hospitals. David Barton Smith helps weave these top-down and bottom-up perspectives together, offering insight into the collaboration between medical civil rights activists, HEW, and the Social Security Administration (SSA) to collect information, craft policy, and achieve hospital desegregation. Yet Smith maintains Dittmer's interpretation of the federal government as a reluctant actor pushed to action by the civil rights movement.[6]

To understand how hospital desegregation was accomplished, we must explore the collaborative relationship between the federal government and the medical civil rights movement. This study aims to contribute to this rich field of scholarship by examining how activists leveraged the power of the federal government and how the government eagerly empowered activists to craft and implement social policy in a mutually beneficially relationship. Among the medical professionals, legal advocates, grassroots organizers, and federal officials working to desegregate hospitals was more shared space and cooperation than division. Activists pressured the government for action, helped shape government policies, created local and national information networks, promoted social learning that eased federal efforts, and even worked on behalf of and within federal agencies. Reciprocally, the federal government leveraged activists' information and networks—as well as the promise of federal funds—as it invoked national authority in the enforcement of Title VI of the Civil Rights Act. By covering such a broad range of local and national activist and advocacy groups and multiple agencies within the executive branch of the federal government, the hospital desegregation campaign was able to work via multiple

ernment's Use of Title VI and Medicare to Racially Integrate Hospitals in the United States, 1963 through 1967," *ibid.*, 87 (Nov. 1997), 1850–58. Jill Quadagno, "Promoting Civil Rights through the Welfare State: How Medicare Integrated Southern Hospitals," *Social Problems,* 47 (Feb. 2000), 68–89, esp. 71.

[6] John Dittmer, *The Good Doctors: The Medical Committee for Human Rights and Struggle for Social Justice in Health Care* (New York, 2009). David Barton Smith, *Health Care Divided: Race and Healing a Nation* (Ann Arbor, 1999).

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pathways of reform to expedite and strengthen the impact of the campaign. The campaign used legal action, professional ethics reform, grassroots community organizing, and nondiscriminatory legislation and policy, and coordinated an efficient bureaucratic initiative to inspect hospitals and root out civil rights infractions. And while it was guided by professional and grassroots activism, the hospital desegregation campaign was largely accomplished through accepted channels of institutional authority—agencies of the federal government, the courts, professional associations, and hospitals. As a consequence, it was partially shielded from the public eye and was able to proceed with little public opposition. This deft collaboration between civil society and government made the quick, efficient, and successful desegregation of hospitals possible.

The desegregation of U.S. hospitals enhances our memory of the role of the federal government in the civil rights movement. At the executive level, President Johnson's dedicated leadership emboldened this dynamic campaign, gave authority to its mission and inspiration to workers involved at all levels, and ultimately ensured its success. Under Johnson, a complex and diverse range of state actors from all branches of the federal government—the Supreme Court and the federal courts, Congress, the Department of Justice, the president's cabinet, and HEW and several of its subagencies, particularly the Office of Equal Health Opportunity (OEHO) and the Office for Civil Rights (OCR)—helped advance the cause, revealing a strikingly complex infrastructure concealed by simplistic descriptors such as "the state" or "the federal government." HEW subagencies, symbols of the bureaucratic growth under Johnson, were created to meet the administrative needs of his Great Society. They represented an expansion of the welfare state and a commitment to equal rights, the central tenets of what Matthew Countryman has described as "civil rights liberalism" solidified under Johnson. The subagencies created an operational apparatus to expedite the reform process and, quite in contrast to the cliché of bureaucratic inefficiency, achieved civil rights compliance in over 92 percent of the nation's hospitals between March and July of 1966.[7]

The example of hospital desegregation reveals a more complex and dynamic relationship between the federal government and civil society than is generally recognized in civil rights historiography. Canonical civil rights scholarship has often depicted the relationship between activists and the government as antagonistic, or ascribed an interventionist, reluctant, or even hostile attitude about civil rights reforms to the federal government. Yet emphasizing the tension between activists and federal officials obscures the reality that collaboration and a common sense of purpose between both parties was necessary to achieve racially progressive reforms. Moreover, portraying the federal government as a monolith belies the atomization and competition that has existed between different federal branches and agencies. In the case of hospital desegregation, the federal government did not appropriate, demobilize, and abandon this civil rights initiative; it worked with and empowered civil rights activists to achieve remarkably quick and successful nationwide reform. Nor was the federal government a reluctant agent of reform. It made hospital desegregation a top priority, allocating enormous resources to accomplish it and conscientiously involving stakeholders in the process. Recognizing the multidimensional and multidirectional nature of these interactions enhances our understanding of the rela-

[7] Matthew J. Countryman, *Up South: Civil Rights and Black Power in Philadelphia* (Philadelphia, 2006), 4–6. Lyndon Baines Johnson, "Statement by the President on the Inauguration of the Medicare Program," June 30, 1966, *American Presidency Project,* http://www.presidency.ucsb.edu/ws/?pid=27692.

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tionships of power that shaped the civil rights movement and encourages a more nuanced appraisal of the participants, strategies, and objectives that defined it.[8]

The history of hospital desegregation fundamentally asserts health care as a civil rights issue. In doing so, it offers a broader and deeper understanding of the civil rights movement that embraces the struggle for health equity and recognizes the role of civil actors in federal civil rights enforcement. At the same time, this enhanced memory of the movement engages generative questions about its priorities, dynamics, successes, and limitations that reveal important lessons for future action against health inequalities.

Separate and Unequal Health Care

The modern U.S. hospital system developed in the early twentieth century, as Jim Crow segregation erected barriers throughout American institutional and public life. Those early twentieth-century hospitals were transformed from places where people went to die to sites where they went to give birth and be healed. Hospital modernization was signified by adopting a therapeutic practice grounded in scientific medicine and a rationalization of space that often involved separating black and white patients, doctors, and staff—and, as a result, drastically reduced opportunities for black doctors to practice and for black patients to receive care. Charity hospitals and a few community health programs sought to compensate for the devastating health consequences of hospital segregation by providing care to underserved black communities throughout the country. Even so, the medical needs of black Americans vastly surpassed their capacity.[9]

As segregated health care pervaded the country, black doctors spearheaded a separatist movement to provide medical resources for black communities. Banned from membership in many local and state medical societies—which was required for membership in the American Medical Association (AMA) and often a prerequisite for hospital privileges—black medical professionals organized separate county, state, and national medical societies and partnered with philanthropists to build dozens of hospitals and training programs over the course of the first half of the twentieth century. As Vanessa Gamble has shown, black hospitals were critical resources for black communities, providing care to patients, professional opportunities to doctors and nurses, and serving as a potent source of community uplift. However, following Abraham Flexner's 1910 report to the Carnegie Institute exposing the depraved state of medical education in the United States, a movement for curricular reform elevated costly new standards that effectively purged all but two black medical schools. The Great Depression further eroded the black medical infrastructure, so that from 1923 to 1940 the number of black hospitals in the United States decreased 40 percent, creating a "black medical ghetto" consisting of only two medical schools—Howard University's College of Medicine, in Washington, D.C., and Meharry

[8] For civil rights scholarship that portrays the federal government as antagonistic, interventionist, reluctant, or hostile toward civil rights reform, see, for example, Aldon Morris, *The Origins of the Civil Rights Movement: Black Communities Organizing for Change* (New York, 1984), esp. 271; Charles M. Payne, *I've Got the Light of Freedom: The Organizing Tradition and the Mississippi Freedom Struggle* (Berkeley, 1995), esp. 360; Mary L. Dudziak, *Cold War Civil Rights: Race and the Image of American Democracy* (Princeton, 2000), esp. 12–13; and Jacquelyn Dowd Hall, "The Long Civil Rights Movement and the Political Uses of the Past," *Journal of American History,* 91 (March 2005), 1233–63.

[9] On the early twentieth-century transformation of hospitals, see Charles E. Rosenberg, *The Care of Strangers: The Rise of America's Hospital System* (Baltimore, 1995).

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Medical College, in Nashville—and only fourteen hospitals with approved teaching programs.[10]

World War II marked the denouement of the black hospital movement and a critical turning point in the medical civil rights movement, as the federal government began subsidizing the expansion of segregated hospitals. In 1946 Congress enacted legislation aimed at modernizing the national hospital system and expanding access to underserved areas, particularly in the South. The Hill-Burton Hospital Survey and Construction Act provided federal matching grants to improve hospital facilities in accordance with a state hospital plan designed to meet the growing need for medical care throughout the state, and was approved by the secretary of HEW and the Federal Hospital Council. That act was one of two pieces of federal legislation that permitted the creation of separate facilities for whites and blacks. Between 1946 and 1963, Hill-Burton funding facilitated the construction of "approximately 70 separate health facilities (less than 1% of all Hill-Burton projects) [that] were constructed either for white or for Negro patients," while the remaining seven thousand projects were classified as "nondiscriminatory," directing that "no patient could be denied any serviceessential to his medical care, [but] patients could be segregated within the facility by race, creed, or color, professionally qualified persons could be denied staff privileges, and interns and residents could be denied training on account of race, creed, or color." Grady Memorial Hospital in Atlanta and Charity Hospital in New Orleans, each with two separate towers—one for white and the other for black patients—boldly enshrined segregated health care in the southern urban infrastructure.[11]

Hill-Burton permitted the creation of separate facilities as a means of guaranteeing that state hospital plans would include provisions for black residents. Karen Kruse Thomas's study of hospital construction in North Carolina between 1935 and 1954 found that Hill-Burton's "separate-but-equal" stipulations did, in fact, succeed in expanding hospital services for black patients with the number of hospital beds available for blacks increasing nearly 60 percent between 1945 and 1960, with eighty-six hospitals and 4,159 beds added to counties with a high concentration of black residents (while the number of white beds increased by 72.5 percent, and 107 hospitals were added to counties with a low concentration of black residents). In expanding the number of hospital beds available to black patients, Hill-Burton also expanded the prevalence of hospital segregation.[12]

Many southern states required hospital segregation by law, but such division was not unique to the South—it was a national problem, affecting blacks in urban and in rural areas, regardless of class, gender, or age. Hospitals practiced segregation in a variety of ways. There were all-white hospitals that denied admittance to black patients, and facilities that received both black and white patients but kept them in separate spaces. Segregation in hospitals was typically characterized by separate waiting rooms and "colored"

[10] Abraham Flexner, *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching* (New York, 1910). Thomas J. Ward Jr., *Black Physicians in the Jim Crow South* (Fayetteville, 2003), esp. 20–24, 28–29. Vanessa Northington Gamble, *Making a Place for Ourselves: The Black Hospital Movement, 1920–1945* (New York, 1995), esp. 185.

[11] U.S. Commission on Civil Rights, "Equal Opportunity in Hospitals and Health Facilities: Civil Rights Policies under the Hill-Burton Program," March 1965, p. 5, *National Institutes of Health, U.S. National Library of Medicine,* https://www.nlm.nih.gov/exhibition/forallthepeople//img/1706.pdf. Public Health Service Act, 42 U.S.C. sec. 291 (1946). On Grady Memorial Hospital's two towers, see H. Jack Geiger interview by Berney, Feb. 22, 2012, digital film (in Berney's possession).

[12] Karen Kruse Thomas, *Deluxe Jim Crow: Civil Rights and American Health Policy, 1935–1954* (Athens, Ga., 2011), esp. 196, 198.

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wards, patient rooms, linens, blood supplies, cafeterias, and employee lounges. These separate facilities were far from equal. Black wards were often located in basements or outbuildings, and black nurseries were relegated to broom closets. Black wards commonly grouped black patients of all ailments together, so that a sixty-year-old man with tuberculosis might be in a bed next to a twenty-seven-year-old pregnant woman. Hospitals also frequently discriminated against black patients by denying them equal-quality services, forcing black emergency room patients to wait to see a doctor until all the white patients had first been treated and forcing black fathers to wait to see their newborn children until the maternity ward was clear of white visitors. As segregated facilities were often forced to compete for resources, white hospitals and segregated hospitals that received black patients had advantages over black hospitals because they were better funded and attracted paying clients. As a result, black hospitals often served a large number of "charity" patients, which strained their already-limited resources. If a black hospital did not have space to receive a patient or the necessary equipment to treat their condition, black doctors would have to ask a white doctor to admit their patients to a segregated hospital, and, if accepted, these patients had to be treated by white doctors unfamiliar with their medical histories. Many places simply did not have enough black hospitals or doctors to effectively treat the black population. In 1964 there were 146.7 physicians per 100,000 white population, and only forty black physicians for 100,000 black population. In Atlanta, where 50 percent of the population was black, only 630 out of 4,500 hospital beds were available to black patients.[13]

The lack of hospital access and the limited number of black doctors—compounded by the correlation between race and poverty, malnutrition, insufficient health literacy, and hardship—had a devastating impact on the quality of black health. In 1960 the U.S. infant mortality rate was 22.9 for whites and 44.3 for blacks per one thousand births, while life expectancy for whites was 70.6 years but only 63.2 years for blacks. On average, there were 10.4 more neonatal deaths and 67.3 more maternal deaths per one thousand births for blacks than for whites. Blacks suffered higher morbidity and mortality rates from cerebrovascular disease, pneumonia, influenza, chronic liver diseases, diabetes, respiratory and digestive cancers, accidents, and homicides. While many of these conditions could have been improved with access to medical care, poor blacks averaged one-third fewer and nonpoor blacks averaged one-quarter fewer hospital and private doctors' visits than their white counterparts. These racial disparities in health are an underrecognized but powerful index of the injustice of Jim Crow segregation.[14]

[13] Max Seham, "Discrimination against Negroes in Hospitals," *New England Journal of Medicine,* 271 (Oct. 1964), 940–43, esp. 940–41. Josephine Disparti interview by Berney, Feb. 22, 2012, digital film (in Berney's possession). Office of Equal Health Opportunity, "Hospital Desegregation: Office of Equal Health Opportunity," paper delivered at the 123rd annual meeting of the American Psychiatric Association, Detroit, May 10, 1967, p. 4, folder 487, box 43, Medical Committee for Human Rights Records, 1963–2004, MC641 (Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania, Philadelphia). On segregated conditions in hospitals see Disparti interview; Geiger interview; Raylawni Brank interview by Berney, July 16, 2012, digital film (in Berney's possession); Aaron Shirley interview by Berney, July 12, 2012, digital film, *ibid*.; and Charles Evers interview by Berney, July 19, 2012, digital film, *ibid*.

[14] On differences in life expectancy, see Robert A. Hummer, "Black-White Difference in Health and Mortality: A Review and Conceptual Model," *Sociological Quarterly,* 37 (no. 1, 1996), 105–25, esp. 106–7. Based on data compiled by the National Center for Health Statistics, 1993. For neonatal and maternal death statistics, see W. Michael Byrd and Linda A. Clayton, *An American Health Dilemma: Race, Medicine, and Health Care in the United States, 1900–2000* (New York, 2002), esp. 361, table 4.8. For racial disparities in morbidity and mortality statistics, see *ibid*., 368, table 4.15. For disparities in medical access, see Karen Davis et al., "Health Care for Black Americans: The Public Sector Role," *Milbank Quarterly,* 65 (supp. 1, 1987), 213–47, esp. 218, table 2.

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Building a Movement

While the federal government subsidized the spread of hospital segregation for nearly two decades following World War II, black medical professionals organized in opposition, supported by activist white physicians. In the postwar period national medical civil rights activism was spearheaded by the National Medical Association (NMA), the black physicians' counterpart to the AMA. While the NMA had been a leader in the separatist black hospital movement since its founding in 1895, in the mid-1940s the NMA adopted an integrationist and activist agenda, signaled in part by forging a closer relationship with the National Association for the Advancement of Colored People (NAACP). This alliance was strengthened by the NAACP board member Louis Wright's creation of the NAACP Committee on Medicine in 1944. Wright had been the first doctor granted privileges at any New York City hospital when he joined the staff of Harlem Hospital in 1919—at the height of the black hospital movement—and for the duration of his career he remained a prominent advocate of hospital integration. While many of his contemporaries feared that integration might jeopardize the hospital care available to black patients, Wright urged that integration might also increase access for black patients and professional opportunities for black doctors.[15]

By the late 1940s, Wright gained support in his calls for hospital integration from members of the white medical community, as several county and state medical societies petitioned the AMA to ban discriminatory membership practices in constituent societies. From 1947 to 1948 the Medical Society of the State of New York (MSSNY)—at the urging of several members who also belonged to the leftist medical group Physicians Forum—presented to the AMA House of Delegates at least four petitions calling on the AMA to come out against membership bias and was defeated every time. The AMA House of Delegates claimed that they were not authorized to dictate membership criteria for constituent societies. The New York City pediatrician Martha Mendell, who was also a member of the Physicians Forum, questioned whether the AMA was truly powerless over constituent societies, suggesting that "surely, if the Southern medical societies decided to admit chiropractors to membership the AMA would quickly find the means of re-defining this autonomy." No other antibias petitions were presented to the AMA until 1963. Given the leftist politics of the MSSNY's petitioners, this may have resulted from the anticommunist assault on doctors that Jane Brickman describes as "medical McCarthyism."[16]

Despite the lull in antibias petitions, the integrationist camp was sustained by the Howard University professor W. Montague Cobb, the editor of the *Journal of the National Medical Association*. Cobb's column "Integration Battle-Front" was a sustaining voice for the medical civil rights movement and increasingly drew NMA members into

[15] On the change in the National Medical Association, see Gamble, *Making a Place for Ourselves,* 182–203. Thomas, *Deluxe Jim Crow,* 168. P. Preston Reynolds, "Dr. Louis T. Wright and the NAACP: Pioneers in Hospital Racial Integration," *American Journal of Public Health,* 90 (June 2000), 883–92, esp. 887, 890.

[16] On the American Medical Association petitions against membership bias, see *Proceedings of the House of Delegates of the American Medical Association, Dec. 6–9, 1949* (Washington, 1950), 39; *Proceedings of the House of Delegates of the American Medical Association, June 26–30, 1950* (San Francisco, 1951), 67; and Dietrich C. Reitzes, *Negroes and Medicine* (Cambridge, Mass., 1958). Martha Mendell, "New York County Medical Society Election Makes News," *Physicians Forum Bulletin* (March 1952), 17–18, reprinted in Jane Pacht Brickman, "Minority Politics in the House of Medicine: The Physicians Forum and the New York County Medical Society, 1938–1965," *Journal of Public Health Policy,* 20 (Sept. 1999), 282–309, esp. 305. Jane Pacht Brickman, "'Medical McCarthyism': The Physicians Forum and the Cold War," *Journal of the History of Medicine and Allied Sciences,* 49 (July 1994), 380–418.

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the fight to end racial discrimination in medicine. In the mid-1950s, Cobb aligned with Paul Cornely, the chair of the Department of Preventive Medicine and Public Health in the College of Medicine at Howard University, who would become the first black president of both the Physicians Forum and the American Public Health Association. Beginning in 1957 Cobb and Cornely collaborated with the NAACP and the National Urban League to organize a series of Imhotep National Conferences on Hospital Integration to mobilize race-conscious members of the medical community and to recruit the support of legal and legislative advocates. By 1962, the Imhotep conferences succeeded in enlisting the support of New York senator Jacob Javitz, Michigan representative John Dingell, and John F. Kennedy.[17]

Yet NMA leadership remained divided over the prudence of using direct-action protest. So, the following June, on the day after Medgar Evers was assassinated, a contingent of twenty NMA members—organized by Cobb, the U.S. Public Health Service officer Walter Lear, and the future NMA president John Holloman—formed the Medical Committee for Civil Rights and mobilized a widely publicized protest of the AMA's annual conference in Atlantic City for its failure to require local chapters to eliminate racially discriminatory membership policies. While this protest failed to affect AMA policies (not until 1968 did the AMA began requiring equal-opportunity membership in its constituent medical societies), it publicized the problem of racial discrimination in medicine just as the Imhotep conferences were drawing powerful legislative and executive actors to support the cause of hospital desegregation. It also gave birth to a new organization that joined in the March on Washington for Jobs and Freedom that August to advocate for medical civil rights alongside the more prominently recognized issues of public education, public accommodations, and voting rights.[18]

The Legal Challenge to Hospital Segregation

Banding together with legal advocates, activist medical professionals successfully challenged Hill-Burton's "separate-but-equal" standard, reversing the federal government's stance on racial segregation in hospitals. Two major court cases that helped establish the legal foundation for challenging discrimination in hospitals were filed in North Carolina and heard before the Fourth District Court. North Carolina had a large black professional class that provided formal and informal leadership for the burgeoning civil rights movement. Many black medical and legal professionals also served as heads of local NAACP chapters, providing advocacy resources to local communities and knitting these disparate localities together in a matrix of civil rights activists that, by the end of World War II, numbered approximately six hundred thousand. Members of North Carolina's black medical community emerged as outspoken civil rights advocates, leading efforts to desegregate education and public spaces and offering leadership to student protestors.

[17] On Paul Cornely and Montague Cobb, see Theodore M. Brown and Elizabeth Fee, "Paul B. Cornely (1906–2002): Civil Rights Leader and Public Health Pioneer," *American Journal of Public Health,* 101 (Dec. 2011), S164. "Proceedings of the Imhotep National Conference on Hospital Integration," *Journal of the National Medical Association,* 49 (July 1957), 189–201, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2641053/pdf/jnma00715-0053.pdf; "Sixth Imhotep Conference Confident of Results from United Broad Effort," *ibid.*, 54 (July 1962), 499.

[18] Dittmer, *Good Doctors,* 18–19. American Medical Association, *Proceedings of the House of Delegates, June 16–30, 1968* (San Francisco, 1969), 211–12. Robert B. Baker et al., "African American Physicians and Organized Medicine, 1846–1968: Origins of a Racial Divide," *Journal of the American Medical Association,* 300 (no. 3, 2008), 306–13.

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In June 1963 the Medical Committee for Civil Rights members John Holloman, Robert Smith, and Walter Lear, shown here, protested outside of the American Medical Association's annual meeting in Atlantic City, New Jersey. *Courtesy* Civil Rights Movement Veterans, *http://www.crmvet.org/.*

Black doctors and dentists in North Carolina also took advantage of their organizational connections to challenge hospitals' discrimination against black patients and practitioners, as well as state medical societies' discrimination against black members.[19]

In 1956 Hubert Eaton, the president of the Old North State Medical Society (founded by black doctors excluded from the North Carolina Medical Society) and member of the Wilmington chapter of the NAACP, joined with three fellow black doctors practicing in Wilmington, North Carolina, to file suit against James A. Walker Memorial Hospital for denying them staff privileges on the basis of race. Eaton was represented by Conrad A. Pearson, general-counsel for the LDF in North Carolina, and Thurgood Marshall and Jack Greenberg from the fund's main New York office. The LDF argued that Walker Memorial Hospital was an instrumentality of the state because it was awarded tax-exempt status for providing a vital public function and therefore was bound to uphold the equal protection clause of the Fourteenth Amendment. However, the Fourth District Federal Court's final ruling in 1958 (upheld on appeal) found that regardless of its tax exemptions, the hospital could not be considered an instrumentality of the state because it was a private corporation administered by an independent board of directors.[20]

While the court rejected the LDF's reasoning that Walker Memorial Hospital's tax exemption constituted an expression of state action, the federal oversight of hospital construction in the postwar period offered another avenue for arguing for the public instrumentality of hospitals. In 1962 the black Greensboro dentist George Simkins sued Moses Cone Memorial Hospital for denying admission to a black patient of his who was suffering

[19] "Nation's Premier Civil Rights Organization," https://naacp.org/nations-premier-civil-rights-organization/. On North Carolina history, see Smith, *Health Care Divided,* 64–95.

[20] *Eaton v. Board of Managers of James Walker Memorial Hospital,* 261 F.2d 521 (4th Cir. 1958). Michael Meltsner, *The Making of a Civil Rights Lawyer* (Charlottesville, 2006), 59–60.

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an extremely high fever due to a systemic infection caused by an abscessed molar. Simkins was president of the local NAACP chapter and had advised North Carolina A&T students in organizing the sit-ins in Greensboro. He also had experience in civil rights litigation, having previously recruited the support of the LDF in a discrimination suit against the Gillispie Park Golf Course. Simkins appealed to the Greensboro attorney Conrad Pearson, who had also argued his case against Gillispie Park, to help him prepare a suit against Moses Cone Memorial Hospital and its affiliate Wesley Long Memorial Hospital. The North Carolina Middle District Court ruled in favor of the defendants in *Simkins v. Cone,* spurring Pearson to enlist the help of Greenberg (who had recently succeeded Thurgood Marshall as lead counsel for the LDF), James Nabrit, and the LDF's new specialist in health care litigation, Michael Meltsner, to develop the argument against Moses Cone Memorial Hospital on appeal. They theorized that because Moses Cone Memorial Hospital and Wesley Long Memorial Hospital had been built not only with $1,269,950 and $1,948,800, respectively, in Hill-Burton funds but also as a component of a statewide hospital system designed in collaboration with the federal government, it therefore performed a state function and was subject to the equal protection clause of the Fourteenth Amendment. On appeal, Attorney General Robert F. Kennedy submitted an amicus curiae brief in support of the plaintiff, for the first time lending the full support of the Department of Justice to challenge the constitutionality of the "separate-but-equal" standard of the Hill-Burton Hospital Survey and Construction Act.[21]

In November 1963 the Fourth Circuit Court of Appeals under Chief Justice Simon E. Sobeloff issued its final ruling against Moses Cone Memorial Hospital, effectively overturning the act's "separate-but-equal" standard. The court cited its finding that "racial discrimination in medical facilities is at least partly responsible for the fact that in North Carolina the rate of Negro infant mortality is twice the rate for whites and maternal deaths are five times greater" and therefore gave rise to a distinct inequality in health care available to black and white residents. The Supreme Court denied a writ of certiorari, which ended the appeals process and upheld the federal court's determination that hospitals constructed with federal funds could not legally discriminate by race.[22]

By the early 1960s, the growing national network of medical civil rights activists forced the federal government to reverse stance on racial segregation in hospitals, from abetting segregation through Hill-Burton's separate-but-equal clause to overtly rejecting its constitutionality. In the fall of 1963 the U. S. Commission on Civil Rights reported that 85 percent of a sample of sixty-four hospitals in southern states indicated that they practiced segregation. Of these, 60 percent had received Hill-Burton construction funds. While the *Simkins* decision had no direct bearing on projects already completed, the U.S. Public Health Service did require that the eight "separate-but-equal" projects then under construction revise their mission to accommodate nondiscriminatory admission, and it asked the 835 "nondiscriminatory" projects then under construction to voluntarily do the same. Seven hundred of those complied.[23]

[21] Meltsner, *Making of a Civil Rights Lawyer,* 59–60.

[22] On the strength and activity of the North Carolina medical community, see David Barton Smith, *The Power to Heal: Civil Rights, Medicare, and the Struggle to Transform America's Health Care System* (Nashville, 2016,), 32–61. *Simpkins v. Moses H. Cone Memorial Hospital,* 323 F.2d 959 (4th. Cir., 1963), cert. denied 376 U.S. 938 (March 2, 1964). Michael Meltsner, "Equality and Health," *University of Pennsylvania Law Review,* 115 (Nov. 1966), 22–38.

[23] U.S. Commission on Civil Rights, *Civil Rights '63: 1963 Report of the U.S. Commission on Civil Rights* (Washington, 1963), 141, http://crdl.usg.edu/cgi/crdl?query=id%3Atmll_hpcrc_03307118&_cc=1. On the public health service request, see U.S. Commission on Civil Rights, "Equal Opportunity in Hospitals and Health Facilities," 8.

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The *Simkins* decision provided precedent for Pearson and Meltsner to represent Hubert Eaton in successfully filing suit again against James Walker Memorial Hospital in 1956. Together, Eaton's and Simkins's victories created a new standard outlawing racial discrimination against patients and doctors in any hospital that had received federal funding. And their wins inspired legislative reform to enable the withholding of federal funds from institutions that practiced racial discrimination—a battle that New York congressman Adam Clayton Powell had fought since the 1950s. The *Simkins* decision provided legal precedent and language for Title VI of the 1964 Civil Rights Act. However, because Title VI lacked effective enforcement mechanisms, it failed to compel hospital desegregation.[24]

Title VI enabled twenty-one federal departments and agencies to withhold funding from institutions found to practice discrimination, amounting to a potential total loss of $18 billion in federal aid. However, section 602 of Title VI impeded the effectiveness of this threat by requiring that governments determine that voluntary compliance failed before federal funds could be withheld and governments must send notice of intent to withhold funds, offering an opportunity for the hospital (or other entity) to have their case heard. Under Title III of the Civil Rights Act, the burden for enforcement fell to the attorney general. The only remedy available to force hospitals into compliance was the Department of Justice filing potentially lengthy and costly lawsuits against each discriminatory hospital independently. As the Department of Justice was tasked with enforcing the desegregation of not just hospitals but all federally funded facilities, the burden of this task overwhelmed resources. To effectively enforce Title VI in hospitals, the federal government drew on the strength of the medical civil rights movement, empowering its leaders to drive national reform.[25]

Medical Civil Rights Organizing at the Grassroots

The legal scaffolding constructed by *Simkins* and Title VI created an important standard for prosecuting hospital segregation, but it was insufficient to compel spontaneous voluntary compliance. While the new law had the capacity to effect change at the national level in a way that medical civil rights activists alone could not, the federal government would have been hard-pressed to enforce Title VI without the swell of support from the medical civil rights movement. Secretary of HEW Anthony Celebrezze recognized this and confessed to NMA members that HEW "cannot meet the responsibilities that we have for the health of the American people without your active and vigorous help." The NMA was instrumental in drawing public attention to the enduring practice of racial discrimination in hospitals, while the LDF maintained pressure on HEW to be more proactive in rooting out offenders and withholding federal funds until they met compliance standards. By the summer of 1964, these professional initiatives were strengthened by the grassroots activities of a growing network of medical civil rights activists.[26]

[24] Smith, *Power to Heal,* 65. *Eaton v. Emory Grubbs and the Board of Managers of James Walker Memorial Hospital,* 329 F.2d 710 (1964). Arthur Krock, "In the Nation: A Court Ruling Extended to Pending Legislation," *New York Times,* March 5, 1964, p. 32.

[25] Civil Rights Act of 1964, sec. 602, 78 Stat. 252 (1964). Reynolds, "Professional and Hospital Discrimination and the U.S. Court of Appeals Fourth Circuit," 715.

[26] For Anthony Celebrezze's quotation, see "H.E.W. Conference on Elimination of Hospital Discrimination," *Journal of the National Medical Association,* 56 (Sept. 1964), 445–6.

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The Student Nonviolent Coordinating Committee (SNCC) initiative to compel federal protection of African Americans' voting rights brought thousands of civil rights activists to Mississippi for Freedom Summer in 1964. As he was providing free care to some of the new volunteers, the Mississippi physician Robert Smith realized that the need for medical aid would only increase with the growing number of Freedom Summer activists. He appealed to the SNCC field director for Mississippi Bob Moses to recruit doctors and nurses. Moses, in turn, encouraged Smith and his colleague James Anderson to organize a group to provide medical services to the protestors. Smith reached out to the New York psychoanalyst Tom Levin, whom he had met at the Atlantic City protest against the AMA in 1963, to help recruit northern doctors and nurses to go south to form a Committee for Emergency Aid. Upon arriving in Mississippi, the medical volunteers (many drawn from the former Medical Committee for Civil Rights) formed the Medical Committee for Human Rights (MCHR), which would become the "medical arm of the Civil Rights Movement."[27]

Following Freedom Summer, MCHR remained active in the civil rights movement as it developed greater independence from SNCC and the Council of Federated Organizations (COFO) and grew into a more substantial nationwide organization. This network of medical civil rights activists catalyzed the federal government's hospital desegregation initiative. MCHR volunteers and other civil rights activists with medical training had recognized early on that a great need for medical care existed among the local population. They became active in providing health education and administering services to local black residents, many of whom had never been to a doctor. The MCHR nurse Josephine Disparti went into black communities throughout Holmes and Jackson Counties to offer treatment and help elderly residents enroll in Medicare. MCHR volunteers gathered information from local black residents and, using a questionnaire prepared by the MCHR nurse and SNCC fieldworker Phyllis Cunningham, made onsite inspections of hospitals and documented discriminatory practices. Their reports detailed physical and social evidence of segregation, including "whites only" and "colored only" signs, substantially substandard services and facilities for black patients, and the complete exclusion of black patients and physicians from hospitals, even in life-threatening emergencies.[28]

Assistant Secretary of HEW James Quigley was well aware of the ongoing discrimination in hospitals, but he lacked the resources to effectively investigate all of the nation's hospitals. HEW was not empowered to bring suit against noncompliant hospitals, but it did have the power of the purse to withhold federal funds from hospitals that had become increasingly reliant on federal support as they sought to modernize their services and utilize more sophisticated equipment. Quigley appealed to MCHR and the LDF to augment his limited staff by gathering evidence of hospital discrimination and filing official complaints with HEW, which he could use as evidence that the federal government should adopt stronger offensive measures. At Quigley's request, the MCHR executive director Johnny Parham and the southern field director Alvin Poussaint, in collaboration with the LDF, used the reports compiled by their fieldworkers to file nearly three hundred complaints with HEW from February 1965 to January 1966, as well as an additional fifty complaints by the end of February 1966. The irony of the federal government asking an

[27] Dittmer, *Good Doctors,* 30–37, 61.

[28] Disparti interview. Phyllis Cunningham interview by Berney, Feb. 21, 2012, digital film (in Berney's possession). Medical Committee for Human Rights compliant reports, folders 379–81, box 34, Medical Committee for Human Rights Records.

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organization affiliated with SNCC to help them compile data and document violations was not lost on MCHR staff, who described it as "the funniest development of the century." Yet, in helping HEW, MCHR demonstrated the dynamic capacity of their organization to work simultaneously in local communities and with the federal government. As they compiled these reports, legislative developments created a new mechanism for enforcement that would make expert use of SNCC's data and networks to desegregate hospitals.[29]

Medicare Creates Incentive for Compliance

On July 30, 1965, President Johnson signed the Social Security amendments that established Medicaid and Medicare. Three weeks later, on August 18, 1965, John Gardner replaced Anthony Celebrezze as secretary of HEW. Gardner took office with a clear understanding that Medicare benefits would be legally subject to Title VI compliance. Celebrezze had made this clear as early as April 1965, while advising the Senate Finance Committee in their deliberations of the pending Social Security amendments. Gardner had the responsibility for administering health services reorganized under HEW (which transferred Title VI enforcement from the surgeon general to the secretary of HEW), and created an Office for Civil Rights that functioned under his assistant secretary, James Quigley, to serve as HEW's central coordinating office in charge of all Title VI activities. The magnitude of this task could not be managed effectively by one small office alone, so Gardner took measures to transform all of HEW into a "civil rights enforcement agency," in the words of the health policy expert David Barton Smith. In doing so, Gardner actualized Johnson's vision for civil rights enforcement. In a memorandum to Vice President Hubert Humphrey that September, Johnson insisted that "it is of paramount importance to attach responsibility for effective civil rights programs to each and every official of the Federal government."[30]

In September 1965 Gardner initiated a five-month process of reorganizing HEW to deputize all staff with the responsibility to enforce Title VI. The reorganization involved the creation of offices for "equal opportunity" in each of the HEW branches, which worked in collaboration with the Office for Civil Rights. While the OCR handled legislative and policy matters, the "equal opportunity" offices directly administered desegregation policies. Thanks to "considerable pressure from various Civil Rights groups such as the Medical Committee for Human Rights, the National Medical Association, the NAACP, and the

[29] For the Department of Health, Education and Welfare (HEW) complaints, see NAACP Legal Defense and Education Fund to John W. Gardner, "Report on the Implementation of Title VI of the Civil Rights Act of 1964 in Regard to Hospital Discrimination. Recommendations for 1966," Dec. 16, 1965, folder 371, box 33, Medical Committee for Human Rights Records. See also Meltsner, "Equality and Health." On the "funniest development," see Mary Holman to Johnny Parham, Feb. 12, 1966, memo, folder 487, box 43, Medical Committee for Human Rights Records.

[30] For the Social Security amendments of 1965, see An Act to Provide a Hospital Insurance Program for the Aged under the Social Security Act with a Supplementary Health Benefits Program and an Expanded Program of Medical Assistance, to Increase Benefits under the Old-Age, Survivors, and Disability Insurance System, to Improve the Federal-State Public Assistance Programs, and for Other Purposes, 79 Stat. 286 (1965). Smith, *Health Care Divided,* 126. Anthony Celebrezze to Senator Harry Byrd, April 27, 1965, Presidential Central Files (Lyndon Baines Johnson Library and Museum, Austin, Tex.), quoted in Smith, *Health Care Divided,* 120. On the reorganization of HEW under John Gardner, see Douglas Cater, "Memos to the President, January 1966 Difference of Opinion between HEW and Budget on Scope of Reorganization Plans," box 14, Office Files of Douglass Cater (Johnson Library and Museum). Smith, *Health Care Divided,* 126. Lyndon Baines Johnson, "Memorandum on Reassignment of Civil Rights Functions," Sept. 24, 1965, *American Presidency Project,* http://www.presidency.ucsb.edu/ws/index.php?pid=27275.

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Members of the Medical Committee for Civil Rights participated in the March on Washington for Jobs and Freedom in August 1963. *Courtesy National Library of Medicine*.

United States Commission on Civil Rights," the Office of Equal Health Opportunity was created in January 1966 to oversee civil rights compliance, with the veteran civil servant Robert Nash appointed to direct a ten-person staff.[31]

Johnson envisioned Medicare as a pivotal component of his Great Society program that would help promote greater equality by diminishing the financial barrier to basic medical care. He recognized the correlation between race and poverty and was acutely aware of Medicare's potential to address racial disparities in health. Yet he also realized that withholding federal aid from hospitals that failed to comply with Title VI would ultimately punish the citizens that relied on those hospitals for care. For six months after Medicare was signed into law, his administration failed to outwardly demonstrate decisive action to enforce civil rights compliance in hospitals. This period of inaction created the perception that HEW did not intend to enforce Title VI vigilantly in hospitals, and as few hospitals acted to demonstrate compliance until the spring of 1966, activists were duly suspicious of the Johnson administration's commitment to civil rights in hospitals.[32]

Yet the lack of action on the ground in the fall of 1965 was intentional. The administration actively sought to keep the enforcement campaign quiet in an effort to arouse as little opposition as possible. Social Security Administration commissioner Robert Ball emphasized the importance of discretion in the early stages of planning. What appeared to be a delay in enforcement was a ploy intended to allow time for adequate planning, staffing, and programming to ensure more effective results. It should not be interpreted as indifference or complacency on behalf of the administration. On the contrary, Gardner resolutely instructed top officials at HEW, the SSA, and the U.S. Public Health Service

[31] Office of Equal Health Opportunity, "Hospital Desegregation," 5.
[32] Dittmer, *Good Doctors,* 135. Disparti interview; Cunningham interview.

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that civil rights compliance in hospitals was "too important to be treated as anything less than our highest priority." Johnson and Gardner were adamant that Medicare would be used to lure southern hospitals into voluntary compliance with Title VI. To be eligible to receive Medicare funds, hospitals would have to demonstrate full compliance. And hospitals simply could not afford to waive Medicare payments, which would become a substantial portion of their annual income. Medicare would desegregate America's hospitals by promoting voluntary compliance and without rousing the massive resistance that plagued efforts to desegregate public schools.[33]

While Johnson and Gardner's leadership was essential, planning for hospital civil rights enforcement was not exclusively a top-down process. In the summer and fall of 1965, members of the Johnson administration met with leadership from the NMA to develop a policy on civil rights enforcement in hospitals. Within a month after Medicare was signed into law, Wilbur Cohen, James Quigley, Robert Ball, and several other HEW and SSA officials met with NMA representatives headed by Montague Cobb to discuss appointing NMA members in senior and advisory positions in federal health administration. That fall, members of the NMA Advisory Board on Health Legislation attended meetings and dinners at the White House and met with HEW to develop civil rights enforcement policy for hospitals. They worked with HEW to coordinate state and regional meetings that involved NMA members throughout the country in policy making. In January 1966 Cohen commended the NMA for their "invaluable advice for setting policy and procedure to implement the law." Indeed, though these meetings drew little fanfare, the NMA's involvement in planning for Title VI compliance in hospitals was critical to the efficiency and success of the initiative.[34]

Medicare was scheduled to go into effect on July 1, 1966. In preparation, 19 million elderly Americans needed to be enrolled, fee schedules had to be set, physicians and hospital administrators had to be educated about Medicare procedures, and nearly 7,500 hospitals needed to be certified in compliance with health and safety standards, as well as Title VI. The sheer scale of the task was a bureaucratic nightmare, which was made worse by the politicization of the legislation and the enduring controversy fanned by the AMA's fastidious opposition. The threat of withholding critical funds from a hospital and jeopardizing the health of the community it served fueled attacks from Medicare's opponents in Congress and in the popular press. SSA and HEW simply could not bear the prospect of massive resistance in addition to the litany of obstacles with which they already contended.[35]

[33] Robert Ball to James Quigley, "PA 16-Title VI Compliance," Oct. 13, 1965, Commissioner's correspondence, 1936–1969 folder, box 300, Records of the Social Security Administration, RG 47 (National Archives and Records Administration, College Park, Md.). Gardner to Wilbur Cohen, Quigley, et al., Dec. 14, 1965, box 7, Records of the Public Health Division, Office of the General Counsel, Department of Health Education and Welfare, RG 235 (National Archives and Records Administration). On Lyndon B. Johnson's and Gardner's insistence that Medicare be used to ensure southern hospitals' compliance with Title VI, see Marilyn Rose interview by David Barton Smith, Oct. 3, 1997, audio tape (in David Barton Smith's possession); and Smith, *Health Care Divided,* 128–29.

[34] On the Johnson and W. Montague Cobb meeting, see Leonidas H. Berry, "Activity of the President's Advisory Committee on Health Legislation—October 1 to November 15, 1965," *Journal of the National Medical Association,* 58 (Jan. 1966), 68, 77. On NMA attendance at White House and HEW meetings, see James M. Quigley, "Hospitals and the Civil Rights Act of 1964," *ibid.*, 57 (Nov. 1965), 455–59. Wilbur J. Cohen, "Medicare: A Five-Month Progress Report," *ibid.*, 58 (Jan. 1966), 73–77, esp. 74. "NMA-HEW Conference on Representation on Federal Advisory Health Councils," *Journal of the National Medical Association,* 57 (Nov. 1965), 535.

[35] Mal Schechter, "Medicare and Desegregation," *Hospital Practices,* 15 (Jan. 1967), 14–18, esp. 14. "Medicare Enrollment: National Trends, 1966–2013," n.d., https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MedicareEnrpts/Downloads/SMI2013.pdf. Smith, *Power to Heal,* 101–22.

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Secretary of Health, Education, and Welfare John Gardner; Health, Education, and Welfare Office of Civil Rights director Peter Libassi; Commissioner of the Social Security Administration Robert Ball, and President Lyndon B. Johnson (shown from left to right) met at the Department of Health, Education, and Welfare on March 1, 1966 to discuss civil rights compliance in the roll-out of medicare. *Courtesy Lyndon Baines Johnson Library and Museum, Austin, Tex.*

To make matters worse, in the fall of 1965 the enforcement of school desegregation by HEW drew national attention when the Commissioner of Education Francis Keppel attempted to withhold over 30 million dollars of federal funding from Chicago public schools pending a complaint of discrimination filed against the school district by the Coordinating Council of the Community Organizations. HEW's policy at the time required that federal funding be withheld from any school district that had an outstanding complaint of discrimination against it, until the complaint could be investigated. Outraged, Chicago mayor Richard Daley met privately with Johnson and pressured him to reverse HEW's action. Johnson responded by ordering an investigation of the matter by the Justice Department, which determined that it was illegal to withhold public funding without an official finding of a violation and prompted Johnson to order that the funds be immediately released. This episode led to the reassignment of Commissioner Keppel to assistant director of HEW and aroused criticism of the president's seeming retreat from civil rights enforcement. Yet it is also significant because it was a lesson about the potential backlash against any threat to withhold essential federal funding, and it forced HEW to develop a more effective and less controversial method of enforcing desegregation.[36]

The Chicago public schools incident prompted Gardner to appoint Peter Libassi as his special assistant in civil rights and head of HEW's new Office for Civil Rights on December 15, 1965. Libassi had formerly worked in the U.S. Commission for Civil Rights, where he was instrumental in drafting the Civil Rights Act of 1964 and was considered one of the foremost experts on Title VI in the federal government. As head of the OCR, Libassi primarily concerned himself with maintaining bureaucratic and legislative support for desegregation, while delegating to his staff the responsibility of ensuring compliance on

[36] William Steif, "The New Look for Civil Rights Enforcement," *Southern Education Report,* 3 (Sept. 1967), 2–8. Smith, *Power to Heal,* 88–93.

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the ground. Libassi made press appearances, communicated with the president and his cabinet, and met with southern governors and congressmen to encourage their cooperation. Libassi's top staff, Sherry Arnstein (special assistant to Assistant Secretary of HEW James Quigley), and the former LDF lawyer Derrick Bell (deputy director of the HEW Office for Civil Rights), communicated with the "equal opportunity" offices and with civil rights advocacy groups. Arnstein, who had experience in desegregating the general hospital in Alexandria, Virginia, was appointed to lead the civil rights enforcement initiative and direct HEW's communications with southern hospital administrators and boards of directors, as well as with state boards of health and medical societies. Arnstein vehemently insisted that unlike school desegregation, hospital desegregation would not proceed with "all deliberate speed." With the full support of Johnson, Gardner, Quigley, and Libassi, Arnstein made sure HEW seized the opportunity to require hospitals to desegregate before they would be eligible to receive Medicare funds.[37]

Two days after Libassi's appointment, the LDF and MCHR held a press conference accusing HEW of failing to enforce Title VI in hospitals. Thus, from the start of Libassi's tenure, the OCR was forced to confront the concerns raised by the LDF, MCHR, and Libassi was not only receptive to them but welcomed their influence. According to Libassi the "relationship between the civil rights agencies, Civil Rights Commission, Justice Department, HEW and so on, and the Civil Rights Movement was really quite close," and the strategies that HEW developed to resolve Title VI violations "were based on the things that the NAACP taught us." As Quigley had intended, Libassi used the complaints filed by the LDF and MCHR to document Title VI violations in hospitals and justify the need for large-scale federal intervention. He and his staff also used the information outlined in the LDF and MCHR complaints to help him develop guidelines for Title VI compliance in hospitals. The complete set of eleven guidelines clearly outlined unacceptable hospital practices, including (1) denying admission to any patient based on race, color, or national origin; (2) maintaining separate entrances, waiting rooms, patient rooms, treatment facilities, or employee areas for whites and blacks; and (3) determining employment eligibility for any staff members based on race. In addition, hospitals were required to post public notice of any changes made to meet compliance standards.[38]

Libassi and OCR staff had the hospital guidelines for Title VI compliance ready by February 1966. Yet they delayed sending them to hospitals until March under the HEW Office of General Counsel's precaution that "delay in sending out the official form would reduce the likelihood of our being challenged directly to accept a hospital not complying with title VI." They were buying time to refine the procedure to enforce the guidelines effectively. Alongside these new guidelines, the OCR crafted a new administrative method of civil rights enforcement. They created a system of administrative hearing boards and appeals courts overseen by pension and disability hearing officers from the SSA, which enabled hospitals that were denied Medicare funds to appeal the decision, though not in a potentially costly and protracted lawsuit. This procedure removed the Justice Department's burden to monitor desegregation on a case-by-case basis by embedding civil rights

[37] Reynolds, "Federal Government's Use of Title VI and Medicare to Racially Integrate Hospitals in the United States," 1853.

[38] David Barton Smith, "Civil Rights Act and Medicare: Historical Convergence and Continuing Legacy," in *Medicare and Medicaid at 50: America's Entitlement Programs in the Age of Affordable Care,* ed. Alan B. Cohen et al. (New York, 2015), 26. Dittmer, *Good Doctors,* 135–36. Libassi interview. "New Guidelines for Hospital Compliance," n.d., folder 489, box 43, Medical Committee for Human Rights Records.

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enforcement in the administrative process. The intent of this strategy was to remove judicial obstacles to bureaucratic enforcement and empower the OEHO to expedite enforcement. Prior to the OEHO's intervention, "civil rights enforcement was largely 'reactive' to complaints by individuals and organizations," however, "with 1966 and the OEHO's formation, it became 'active.'"[39]

Inspecting Hospitals for Civil Rights Compliance

On February 23, 1966, HEW secretary Gardner announced to the press that HEW had received complaints against 220 hospitals for violating Title VI. Gardner asserted that no hospital would receive Medicare funds without demonstrating Title VI compliance, and to ensure that this was the case, he authorized a massive compliance inspection initiative organized by OEHO director Robert Nash. In March 1966 Gardner allied with secretary of SSA Robert Ball and Surgeon General William Stewart to help expand OEHO staff and resources. Ball supplied an entire floor of the Social Security Building for the auxiliary OEHO offices and several phone lines, and extended to Nash his personal assistance in obtaining any required supplies. Both Ball and Stewart redistributed staff to enhance OEHO's small permanent staff, which Nash used to assemble an in-house staff of one hundred employees drawn from other HEW departments, and an additional three hundred field inspectors to evaluate hospitals for compliance and determine their eligibility for Medicare certification. Nash also hired the MCHR founding member and recently elected NMA president John Holloman as a part-time consultant to assist in contacting physicians throughout the South to identify recalcitrant hospitals. Throughout the spring, Holloman would spend one day per week at SSA headquarters in Baltimore making calls from the OEHO central office. The networks that the NMA had spent decades developing were fundamental to the coordination and quick success of the federal hospital inspection initiative. Consequently, the federalization of the hospital desegregation effort was not a break from grassroots and professional activism but was, rather, a working collaboration between the federal government and the medical civil rights movement.[40]

To begin compliance inspections, on March 4 OEHO mailed a letter explaining the guidelines for hospital desegregation and a questionnaire itemizing various hospital practices to all of the nation's hospitals. To demonstrate eligibility, hospitals had to return to OEHO a completed questionnaire verifying no Title VI violations and a signed assurance of compliance. By April, Gardner reported that 6,250 hospitals—approximately 70 percent of the nation's 8,500 general hospitals—had responded to the questionnaire. Of these, four thousand hospitals were found in compliance with Title VI, nearly 2,500, most located in the South, were identified as requiring potential civil rights enforcement interventions. In Louisiana, Mississippi, South Carolina, and Virginia, over 90 percent of the hospitals in the state were found to be in violation of Title VI. In Florida, Alabama, and

[39] Alanson W. Willcox to F. Peter Libassi, Feb. 3, 1966, box 7, Records of the Public Health Division, Office of the General Counsel, Department of Health Education and Welfare. On the burden on the Justice Department, see Libassi interview. For the Office of Equal Health Opportunity (OEHO) quotation, see Schechter, "Medicare and Desegregation," 18.

[40] John Gardner, "Statement by the Secretary on Receipt of U.S. Civil Rights Commission Report," Feb. 23, 1966, folder 487, box 43, Medical Committee for Human Rights Records. On John Holloman's hiring, see Smith, *Health Care Divided,* 136; and Dittmer, *Good Doctors,* 137.

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Jack Geiger and Alvin Poussaint, both members of the Medical Committee for Human Rights, are shown here at a training session for hospital inspectors in Atlanta, Georgia, in April 1966. *Courtesy Charmain Reading.*

Georgia, between 85 and 90 percent were in violation, and in North Carolina nearly 80 percent were in violation.[41]

The conspicuous defiance among southern hospitals confirmed OEHO's plan to begin the inspection initiative by targeting states that required segregation by law. OEHO sent out a second mailing to comb for any well-meaning stragglers, reached out to state boards of health and hospital administrators to encourage compliance, and began dispatching teams of compliance inspectors to review recalcitrant hospitals. HEW worked in collaboration with the SSA to assemble and train teams formed from 750 compliance inspectors to visit three thousand hospitals in the spring and summer of 1966. It held two training sessions in Atlanta in early April (and another in Dallas in early May) in which the MCHR members Alvin Poussaint, Jack Geiger, and Phyllis Cunningham instructed the inspection teams in performing their reviews, to detect subterfuge, to protect themselves in the event of any aggressive backlash, and, most importantly, to make contact with members of local black communities before arriving at a hospital. Appealing to guidance from veteran civil rights groups, representatives from the Congress on Racial Equality, SNCC, the NAACP, the Southern Christian Leadership Conference, and the National Urban League were also invited to attend this training.[42]

[41] Of the 8,500 general hospitals that received the questionnaire, only about 7,400 were eligible to participate in Medicare. See John Gardner, "Secretary Gardner Statement regarding Hospital Compliance," April 14, 1966, folder 487, box 43, Medical Committee for Human Rights Records; and Schechter, "Medicare and Desegregation," 18. On the OEHO letter, see Steif, "New Look for Civil Rights Enforcement," 5. For the regional statistics, see Reynolds, "Professional and Hospital Discrimination and the U.S. Court of Appeals Fourth Circuit 1956–1967," 716.

[42] William Stewart to Gardner, Jan. 11, 1966, folder PA 16, box 300, Records of the Social Security Administration. On the invitations to veteran civil rights groups, see James P. Murray to Ball, April 8, 1966, *ibid*. Cunningham interview. Alvin Poussaint interview by Berney, March 2012, digital film (in Berney's possession). Smith, *Power to Heal*. Dittmer, *Good Doctors,* 136–39.

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Inspection teams consisted of one senior permanent HEW or SSA employee and a volunteer recruited from various federal departments and agencies, including HEW, SSA, the Food and Drug Administration and the National Institutes of Health (NIH). Several of the volunteers, including the NIH fellows Paul Plotz and Jesse Roth, were already active in the civil rights movement and were members of MCHR. When they arrived in a new town they were able to draw on civil rights networks, sometimes through local chapters of the NAACP or the Urban League, to make contact with preidentified informants and leaders within the local black community—often school principals, ministers, and undertakers—to identify specific violations to look for when they inspected the hospital. Inspectors encountered various methods of subterfuge—such as "the HEW shuffle," where hospitals would temporarily rearrange their patients and cover "colored" and "white" signs to suggest an "integrated look"; "comatose integration," where hospitals would put unconscious white patients in the same room as a black patient; and the Rubber Negro Syndrome, in which hospitals would exaggerate the number of black patients they admitted, sometimes even disguising black employees as patients. There were also some instances of aggressive confrontation, where white supremacist hospital administrators vented their anger at inspectors. Roger Platt who inspected hospitals in Louisiana as a medical student, recalls the director of Confederate Memorial Hospital in Shreveport (now Louisiana State University Medical Center), angrily insisting that his hospital would never grant staff privileges to black doctors to prevent them from coming into intimate contact with white female patients. And there were instances in which inspectors were intimidated, threatened, and even attacked by local white supremacists. One hospital inspector was shot at outside of Natchez, Mississippi, and run out of another town when an administrator "called the Klan on him," and the OCR general counsel Marilyn Rose discovered the lug nuts on her rental car had been loosened while she visited a mental health hospital in Tuscaloosa.[43]

In contrast to such instances of tension and danger, in most cases hospital desegregation was a surprisingly smooth process. When a court order forced Grady Memorial Hospital in Atlanta to desegregate by July 1, 1965, its superintendent, Bill Pinkston, feared violent public backlash. They waited until the last minute to comply with the court's order, and on the evening of June 30 they "just pushed the beds around" to create integrated hospital rooms, and the next morning the hospital proceeded with its normal daily activities without any disturbance. Similarly, when HEW pressured the Louisiana Hospital Association to encourage the state Red Cross blood bank to desegregate their blood supply or jeopardize Medicare funding for all of the hospitals in the state, the blood bank responded by immediately integrating their supply. Bobby Childers, commander of region III of the SSA (which included Kentucky, West Virginia, North Carolina, South Carolina, Virginia, Maryland, and Washington, D.C.), recalled that many hospital administrators welcomed the federal mandate to integrate as a means of justifying to their boards of directors and local communities a reform that helped rationalize costs. Similarly, Nash recalled that of the three thousand hospitals that inspectors visited, nearly "2,000 hospitals changed their discriminatory practices even before our team came to visit." Childers attributed the success of the federal hospital desegregation initiative to three factors: the humane and urgent nature of emergency medical care; the

[43] Office of Equal Health Opportunity, "Hospital Desegregation," 8–9. Roger Platt interview by Berney, Feb. 23, 2012, digital film (in Berney's possession). Julian Suttle interview by Berney, Aug. 5, 2015, digital film, *ibid*. Rose interview.

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relatively depoliticized nature of hospital administration (because hospital boards were typically appointed, not elected), and, perhaps most importantly, the collaborative approach that the federal investigators adopted in working with hospital administrators and state boards of health to achieve compliance.[44]

Robert Nash described the hospital inspection initiative as a "quiet revolution" because it failed to arouse the same public controversy associated with school desegregation, integrating public accommodations, and voter registration. Yet it is important to recognize that this revolutionary transformation was able to progress so "quietly" because it built on a foundation laid by a vast network of professional and grassroots civil rights activists. Rims Barber, a Presbyterian minister from Iowa who moved to Mississippi after his work there with the National Council of Churches during Freedom Summer, attributes the lack of public opposition to hospital desegregation to a gradual process of social learning encouraged by civil rights activists in their local communities. As education director for the Delta Ministry, Barber trained civil rights activists to make gradual appeals to local white residents to recognize the harmful effects of segregation on the health of African Americans. They would develop relationships with individuals and over the course of several conversations they would escalate the urgency of their case, ultimately introducing these white southerners to blacks within their own communities who could testify to the injustice of hospital segregation. This was slow work with uneven results, but activists succeeded in appealing to the consciences of white southerners to recognize the necessity of hospital integration, regardless of their prejudices. This grassroots social education was critical in discouraging massive resistance that might have jeopardized both the campaign to desegregate hospitals and the Medicare program.[45]

Johnson's Leadership Sustains the Civil Rights Enforcement Effort

On June 15, 1966, just two weeks before Medicare was to take effect, Johnson assembled an audience of three hundred representatives from the AMA, the American Hospital Association, state medical and hospital associations, hospital administrators, and physicians to discuss the current status of preparations for the rollout of Medicare on July 1. He acknowledged the success of the hospital desegregation campaign, noting that approximately 80 percent of American hospitals had already met compliance standards. Even so, he also called attention to the lingering problem of recalcitrant hospitals, recognizing that "in some communities older people may be deprived of medical care because their hospitals fail to give equal treatment to all citizens and they have discrimination practices." He insisted that "the answer to that problem is a simple one and that Congress has given it in the law itself: we ask every citizen to obey the law." Libassi had helped prepare the president's comments and distinctly remembers Johnson improvising a clear mandate to his audience—taking off his glasses to emphasize his point, Johnson exclaimed that he was "not going to lock the barn door after the horse has been stolen; we're going to

[44] J. William Pinkston Jr. interview by Smith, June 10, 1996, audio tape, (in Smith's possession), quoted in Smith, *Health Care Divided,* 114. For the Louisiana blood bank integration anecdote, see *ibid.*, 137. Bobby Childers interview by Vanessa Burrows, Jan. 4, 2012, digital recording (in Berney's possession). Robert M. Nash, "Compliance of Hospitals and Health Agencies with Title VI of the Civil Rights Act," *American Journal of Public Health,* 58 (Feb. 1968), 246–51, esp. 247–48.

[45] Nash, "Compliance of Hospitals and Health Agencies with Title VI of the Civil Rights Act," 247. Rims Barber interview by Berney, July 13, 2012, digital film (in Berney's possession).

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desegregate the hospitals." Johnson asked his audience to offer their leadership in their local communities, to "get action—action at the community level—to solve the problems which could hamper this program."[46]

During the June 15 presidential meeting on Medicare implementation, a column of civil rights protestors were simultaneously headed to Jackson on the March against Fear that James Meredith was prevented from finishing when he was shot two days into the march. Three days after Meredith's shooting, Armstead Phipps, a middle-aged black man from Mississippi died from a heart attack while on the march. Martin Luther King Jr. held a press conference attributing Phipps's death to the depraved quality of health care for black Mississippians. Marchers were routinely met with antagonism by law officers and civilian bystanders. This harassment erupted on the night of June 16, when a number of protesters were jailed after a violent conflict with authorities in Greenwood, Mississippi. One might assume, given the powerful racial tension that marchers encountered that June, that desegregation efforts in Mississippi might have been met with violent resistance. Yet at the Jackson campus of the University of Mississippi Medical Center, Dean Robert Q. Marston was able to remove Jim Crow signs and reassign patient beds to achieve integration without drawing public notice or retaliation—a stark contrast to the riots that broke out at the main campus in Oxford when James Meredith enrolled there as the first black student to attend.[47]

While HEW inspectors worked on the ground to promote compliance, Gardner, Quigley, and Libassi worked in Washington to pressure southern politicians to encourage compliance among their constituents or risk losing Medicare funding for their entire state. Vice President Hubert Humphrey personally telephoned the mayors of Baton Rouge, New Orleans, Greensboro, Nashville, Knoxville, Houston, Jacksonville, Dallas, and several cities in Alabama to encourage their compliance. However, as late as June 23 compliance rates in Alabama and Georgia were barely over 50 percent, and only 20 percent in Mississippi. To ensure Medicare patients access to hospital care in these states, HEW outlined four emergency exceptions to allow noncompliant hospitals to receive funding for treating Medicare recipients—only in a "serious emergency" could noncompliant hospitals receive funding; in a "life-endangering emergency" federal hospitals could admit civilians; and by special permission of the secretary of the armed services a civilian could be treated in a service hospital. The emergency provisions did create loopholes that enabled segregated hospitals to subvert enforcement. In the 1967 fiscal year, 21,000 claims for Medicare emergency payments totaled approximately $6 million, out of a total of $2 billion for all Medicare hospitalizations. Eighty-six percent of these emergency claims were filed in the South, mostly in Alabama and Mississippi.[48]

By June 30, 1966, the day before Medicare went into effect, 92 percent of the nation's hospital beds were certified in compliance with Title VI. HEW continued to perform

[46] Lyndon Baines Johnson, "Remarks at a Meeting with Medical and Hospital Leaders to Prepare for the Launching of Medicare," June 15, 1966, *American Presidency Project,* http://www.presidency.ucsb.edu/ws/?pid=27650. Libassi interview.

[47] On Martin Luther King Jr.'s press conference on poor health care, see "Tell Meredith Marchers to be Peaceful," *Chicago Tribune,* June 10, 1966, p. 19; and Poussaint interview. On the Greenwood incident, see David J. Garrow, *Bearing the Cross: Martin Luther King Jr. and the Southern Christian Leadership Conference* (London, 1986), 473–81. Richard D. DeShazo, Robert Smith, and Leigh Baldwin Skipworth, "A White Dean and Black Physicians at the Epicenter of the Civil Rights Movement," *American Journal of Medicine,* 127 (June 2014), 469–78.

[48] On political strategy, see Libassi interview. On Hubert Humphrey's phone calls, see Smith, *Health Care Divided,* 138. Mal Schechter, "'Emergency' Medicare and Desegregation: Subterfuge Ends," *Hospital Practice,* 5 (Jan. 1970), 17–23, esp. 17. For statistics on hospitals then still segregated, see Smith, *Health Care Divided,* 140.

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inspections and further reduce noncompliance and by the end of 1966, 98.4 percent of the eight hundred thousand general hospitals beds in the country were cleared, and 7,090 out of 7,452 hospitals that were potentially eligible to participate in Medicare had been certified in compliance. Approximately 360 hospitals still boldly refused to desegregate, 80 percent of which were in the South. Of the uncertified hospitals, 213 were outside of the OEHO's authority because they received no federal funds and opted to abstain from the Medicare program to preserve segregation. Out of the three thousand hospitals visited by HEW inspectors, the OEHO documented changes to meet compliance standards in nine hundred hospitals after initially failing on-site inspections. Forty percent took measures to integrate waiting rooms, patient rooms, and operating facilities; 22 percent began admitting black patients; 13 percent granted staff privileges to black physicians; and 7 percent admitted black students to training programs.[49]

The Retreat from Reform

Despite the over 90 percent success rate and the OEHO's ongoing inspection efforts, the defiant hospitals stood out as flagrant violators of the law, and HEW drew criticism for failing to punish the offenders adequately. To some extent, the enforcement procedures stipulated in the law hindered efficient enforcement. In accordance with the notice-of-intent statute in section 602 of Title VI, HEW sent hearing notices to all recalcitrant hospitals, permitting them the opportunity to contest the withholding of federal aid. By the end of the year, over two hundred hospitals had been issued hearing notices, but only eleven ultimately had their funds cut off.[50]

By May 1967, 95 percent of the nearly 7,500 general hospitals potentially eligible to participate in Medicare were found to be in compliance. About 330 still refused to comply, with seventy-two of that group in Mississippi, representing 60 percent of the hospitals in the state. Both within Congress and in the general population, there was a widespread sense that "only the most open forms of segregation were being curbed, and largely in the South," whereas, "in the North, where segregation takes subtler forms, the compliance effort was regarded as largely ineffective." New Jersey senator Clifford Case criticized OEHO's "perfunctory" on-paper certification clearance, a sentiment that even OEHO personnel echoed. OEHO officers expressed regret that "far too many hospitals that were cleared on paper have later turned up with a complaint against them or have subsequently been found out of compliance." They also bemoaned that political interference and lack of adequate funding thwarted ongoing compliance inspection efforts, noting that when HEW issued hearing notices to hospitals, "generally the Justice Department and the White House are also notified allowing for political pressures to be brought to bear from an angry congressman who feels his election may be insecure if Civil Rights legislation is too rigorously enforced."[51]

[49] Civil Rights Act of 1964, sec. 602, 78 Stat. 252 (1964), codified at 42 U.S.C. sec. 2000d-1. Schechter, "Medicare and Desegregation," 14. Eve Edstrom, "Segregation Mars Start of Medicare: Johnson's 11th-Hour Plea Fails; Holdout Hospitals in South," *Washington Post,* July 1, 1966, p. A1. John Herbers, "More Hospitals Comply on Rights: Those Certified for Medicare Contain 92% of Beds," *New York Times,* July 1, 1966, p. 16.

[50] Medical Committee for Human Rights, 1968, memo, folder 487, box 43, Medical Committee for Human Rights Records. Civil Rights Act of 1964, sec. 602, 78 Stat. 252 (1964), codified at 42 U.S.C. sec. 2000d-1.

[51] Office of Equal Health Opportunity, "Hospital Desegregation," n.d., folder 487, box 43, Medical Committee for Human Rights Records. Schechter, "Medicare and Desegregation," 15.

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As the OEHO struggled over the procedural hurdles to enforce Title VI compliance, the House Subcommittee on HEW Appropriations, led by Rhode Island representative John E. Fogarty, and the Senate Appropriations Committee under Alabama senator Lister Hill cut the HEW budget for Title VI enforcement for fiscal year 1967 by 25 percent, down to $3.4 million from the already conservative request of $4.3 million. The cuts seriously hindered the OEHO's activities, forcing them to scale back instead of expand inspections and "took the heart out of OEHO's preparations for a crash effort among nursing homes." They also reversed the proactive nature of OEHO's Title VI enforcement, which had enabled their remarkable success, and reverted much of the responsibility for enforcement to the states.[52]

This was evident by May 10, 1967, when Secretary Gardner announced that HEW would be critically restructured to streamline new enforcement policies. In response to the HEW budget cuts, Gardner declared his intention to consolidate the various "equal opportunity" offices into a central unit under the OCR. Isolating civil rights enforcement within OCR not only demobilized the agency-wide commitment to civil rights but also enabled its opponents to target a single office. The restructuring heralded the denouement of the federal Title VI enforcement initiative and left simmering resentment about its limited success.[53]

The drastic HEW budget cuts and the dismantling of the OEHO stymied ongoing hospital inspection efforts. This meant that the areas most in need of help were neglected, and many hospitals not in compliance in the Deep South were able to continue their discriminatory practices. George Allen inspected hospitals in east Texas and Louisiana from 1967 to 1971 and found that insufficient funding of the inspection program rendered it ineffective. As part of a team of six inspectors, Allen was often forced to perform inspections alone and had very few resources to perform follow-up inspections. Large urban hospitals were more inclined to comply with Title VI, but small rural hospitals posed more of a problem in enforcement and attracted less attention. Consequently, minorities in rural communities who would have to travel many miles to find an integrated hospital continued to be denied care.[54]

Segregation in hospitals continued not only in the Deep South but also in northern hospitals, which had never been the main focus of HEW's enforcement efforts. In the North, where residential segregation and socioeconomic inequality perpetuated racial discrimination, overt bias in hospitals was more difficult to root out than in the South, where Jim Crow signs and laws made the problem easier for inspectors to identify. Black hospital patients in the North were often turned away when hospitals filled informal quotas for uninsured or black patients. By offering previously uninsured black patients funding for hospital care, Medicare helped diminish the problem of patient "dumping" but did not eliminate it, and the lack of ongoing enforcement efforts meant that black patients might still be denied equal access to hospitals by physicians who refused to admit them to certain hospitals, or by nurses who assigned them to only certain wards or patient rooms. To make matters worse, the integration of hospitals had a devastating impact on black hospitals, drawing away former "charity" patients who were now insured

[52] Schechter, "Medicare and Desegregation," 18.
[53] Steif, "New Look for Civil Rights Enforcement," 2.
[54] George Allen interview by Berney and Vanessa Burrows, May 27, 2015, digital audio recording (in Berney's possession).

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and enabling black doctors to obtain internships and admitting privileges at previously segregated hospitals. Losing patients and doctors, black hospitals dwindled from 124 in 1944 to only eight in 1993.[55]

Insufficient funding for Title VI compliance inspections also hindered civil rights enforcement in nursing homes and mental health hospitals throughout the United States. These many examples of ongoing racial discrimination in health care may create the perception that the Title VI enforcement initiative was unsuccessful. Yet, without apologizing for these failures, we must recognize that, as a result of the hospital inspection campaign, black patients across the country were able to access hospital care, and black doctors were able to gain hospital privileges. Most hospitals that welcomed desegregation as an opportunity to rationalize costs were not eager to resegregate and needlessly increase their budgets. Most importantly, the successful desegregation of over 95 percent of the nation's hospital beds led to a substantial increase in the quality of health of millions of black Americans.[56]

Measuring the impact of hospital desegregation on the quality of health of black Americans is difficult because morbidity and mortality rates are influenced by numerous factors that health care alone cannot alleviate. Even removing racially discriminatory barriers to hospital access does not remove economic and transportation barriers that continued to hinder African Americans' ability to visit hospitals. However, changing trends in African American infant mortality rates following the implementation of Medicare offer evidence of how the desegregation initiative did increase African Americans' access to hospitals and how their health improved as a result.

Prior to 1965 black infant mortality rates in the rural South averaged about five per one hundred black births—approximately twice the rate among rural whites. However, between 1965 and 1970 the black infant mortality rate declined from 4.0 to 2.8, and the ratio between black and white infant mortality fell from 1.9 to 1.65, representing "the only prolonged convergence [of black and white infant mortality] in the post–World War II era." The political scientists Douglas Almond, Kenneth Chay, and Michael Greenstone attribute this drastic decrease in black infant mortality to increased access to prenatal, intrapartum, and postpartum medical care made possible by increased access to hospital birthing—especially the administration of intravenous antibiotics and fluids to prevent death from common conditions such as diarrhea, gastroenteritis, and pneumonia. Throughout the 1950s, less than 60 percent of black babies in the rural south were born in hospitals, but by 1965 this number rose to 70 percent, and by 1970 it reached approximately 90 percent.[57]

In rural Mississippi, the improvements were even more drastic. Mississippi had the highest rates of infant mortality in the nation, with the worst rates concentrated in the Delta region, where hospital births of black babies rose from 40 percent in 1965 to 90

[55] Gamble, *Making a Place for Ourselves,* 191. Sidney Feldman interview by Berney, July 7, 2015, digital video recording (in Berney's possession).

[56] David Barton Smith et al., "Separate and Unequal: Racial Segregation and Disparities in Quality across U.S. Nursing Homes," *Health Affairs,* 26 (Sept.–Oct. 2007), 1448–58. Edward D. Berkowitz, *Robert Ball and the Politics of Social Security* (Madison, 2003), 147. On mental hospitals, see Childers interview.

[57] Kenneth Y. Chay and Michael Greenstone, "The Convergence in Black-White Infant Mortality Rates during the 1960s," *American Economic Review,* 90 (no. 2, 2000), 326–32, esp. 328, 326, 330. For further explanation of this data, see Douglas Almond, Kenneth Y. Chay, and Michael Greenstone, "Civil Rights, the War on Poverty, and Black-White Convergence in Infant Mortality in the Rural South and Mississippi," Dec. 21, 2006, working paper 07-04, Massachusetts Institute of Technology Department of Economics Working Papers Series, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=961021.

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percent by 1972. The number of Medicare-certified hospitals in Mississippi rose from a mere 20 percent in June 1966 to 60 percent in February 1968, to 67 percent by October 1968, and 77 percent by 1969. Of the fifteen Delta counties that had Medicare-certified hospitals, the black infant mortality rate due to pneumonia and diarrhea fell by 64 percent from 1965 to 1968. As a result, "nearly all of the 1965–[19]68 reduction in black infant death due to preventable causes in the Delta was concentrated in counties containing hospitals that were in compliance with Title VI."[58]

While this evidence is only suggestive of a larger national trend in improved health outcomes, it indicates that hospital desegregation enabled crucial hospital access that saved an unknown number of black lives. As the *Hospital Practice* editor Mal Schechter noted, "what had been done to eliminate separate accommodations, entrances and wards could hardly be undone." Given the work that remained, it was difficult to appreciate the triumph that the desegregation initiative, in Nash's words, "at the very least . . . opened the doors."[59]

Conclusion

The desegregation of U.S. hospitals is a monumental achievement in civil rights advancement seldom remembered in the standard narrative of the civil rights movement because the process challenges common discursive categories of civil rights historiography and public memory. It forces us to consider carefully the relationship between the federal government and civil rights activists and between the permeability of the state and its capacity to empower activist groups. Federal civil rights policy was not created and implemented in an exclusively unidirectional, top-down manner, nor did it co-opt and demobilize a social movement. Medical civil rights activists influenced the federal hospital desegregation initiative from within the government, as parastatal actors and as civilians. The medical civil rights movement created a matrix of social resources, human capital, and will for reform that energized the Johnson administration's hospital inspection campaign. The successful use of Medicare to enforce Title VI was not simply a federal mandate; it was effective because the Johnson administration invited civil rights activists into policy-making positions and because activists were poised to take advantage of the opportunity to work with a receptive federal administration. More than merely an augmentation of our memory of the civil rights movement, the history of hospital desegregation asserts health care as a civil right and demonstrates the immense potential to advance health equity and civil rights through collaborations that partner social groups with government.

[58] Almond, Chay, and Greenstone, "Civil Rights, the War on Poverty, and Black-White Convergence in Infant Mortality in the Rural South and Mississippi," p. 44, table 5, p. 40, table 1, p. 19.
[59] Schechter, "Medicare and Desegregation," 18.

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SSM - Population Health 4 (2018) 17–24

Contents lists available at ScienceDirect

SSM - Population Health

journal homepage: www.elsevier.com/locate/ssmph

Article

Civil rights as determinants of public health and racial and ethnic health equity: Health care, education, employment, and housing in the United States

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ABSTRACT

This essay examines how civil rights and their implementation have affected and continue to affect the health of racial and ethnic minority populations in the United States. Civil rights are characterized as social determinants of health. A brief review of US history indicates that, particularly for Blacks, Hispanics, and American Indians, the longstanding lack of civil rights is linked with persistent health inequities. Civil rights history since 1950 is explored in four domains—health care, education, employment, and housing. The first three domains show substantial benefits when civil rights are enforced. Discrimination and segregation in housing persist because anti-discrimination civil rights laws have not been well enforced. Enforcement is an essential component for the success of civil rights law. Civil rights and their enforcement may be considered a powerful arena for public health theorizing, research, policy, and action.

"…race is the child of racism, not the father".

Coates (2015).

Individual and community health are affected by their social and physical environments and resources available or absent in those environments World Health Organization (2010). Here we provide: 1) a framework for understanding how civil rights laws and their implementation, including enforcement are components of the social environment; 2) a summary of the evolution of civil rights law in U.S. history; 3) evidence that civil rights laws enacted since 1950 on (a) health care, (b) education, (c) employment, and (d) housing have (or have not) had beneficial effects on the health or on other social determinants of health of racial and ethnic minority populations previously lacking those rights; and 4) evidence that civil rights is an arena for public health theorizing, research, collaboration, policy, and action.

Framework: civil rights as a social determinant of health

"'Civil rights are such as belong to every citizen of the state or country, or, in a wider sense, to all its inhabitants, and are not connected with the organization or administration of government. They include the rights of property, marriage, protection by the laws, freedom of contract, trial by jury, etc"(Garner, 2004).

A central notion of civil rights is that, with rare exception such as persons convicted of felony, rights available to any adult citizen are available to all, and that these rights cannot be denied to any person because of race, ethnicity, sex, or other protected class.[1] Some government programs such as Medicare and Medicaid are provided only to persons qualified by age, income, or medical condition; however, within eligible populations, denying these benefits because of a beneficiary's race or sex violates civil rights. Civil rights laws generally protect citizens from discriminatory practices by governments and institutions, but in some instances also protect citizens from discriminatory practices by other citizens Chemerinsky (2006). Civil rights may be protected by state and federal constitutions, statutes, and regulations interpreted by court decisions.

Civil rights laws and their enforcement are social determinants of health because they affect other social determinants of health, that is, elements of a society's organization and process, such as education,

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[1] Civil rights laws and rulings commonly designate or apply to a protected class: "A class of individuals to whom Congress or a state legislature has given legal protection against discrimination or retaliation." (https://www.law.cornell.edu/wex/protected_class)

https://doi.org/10.1016/j.ssmph.2017.10.006
Received 21 September 2017; Received in revised form 23 October 2017; Accepted 31 October 2017
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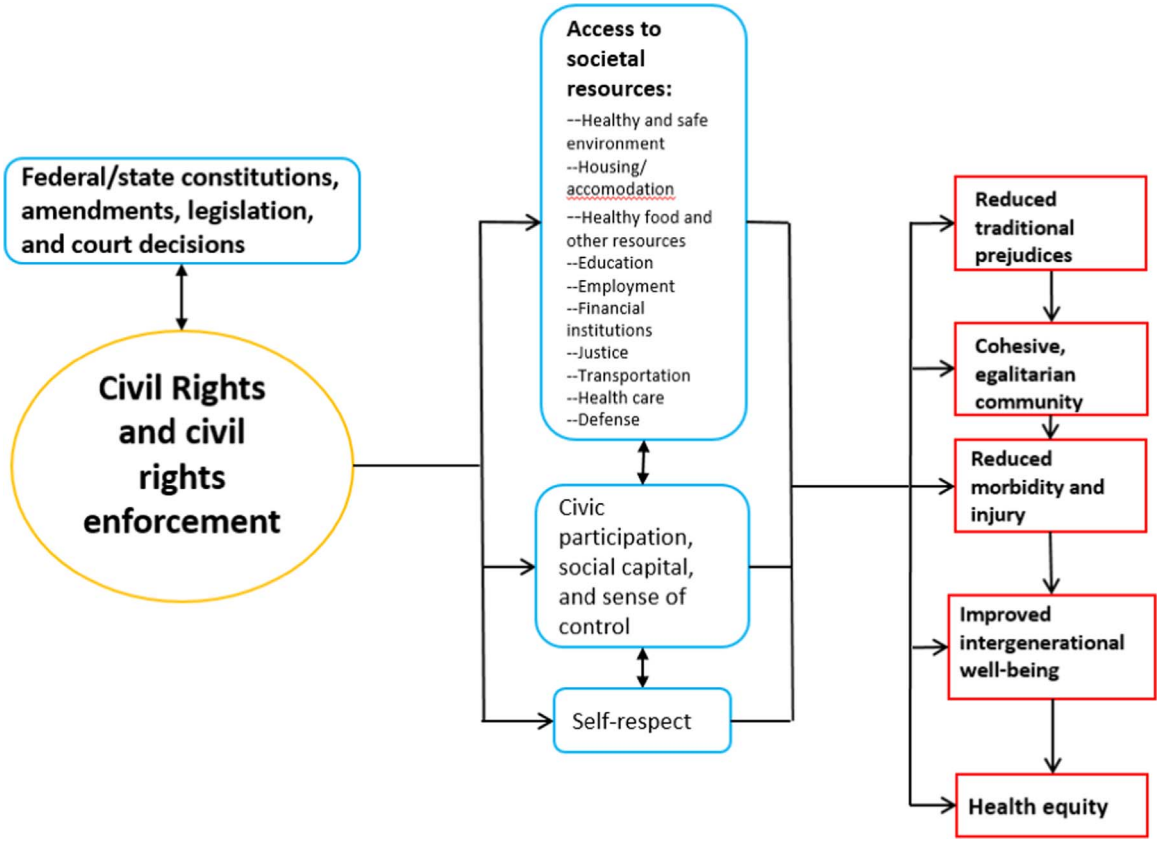


Fig. 1. Effects of civil rights laws on public health and health equity.

housing, transportation, employment, and the system of justice, that causally affect the societal distribution of resources that in turn affect disease, injury, and health (Fig. 1). Social determinants, including civil rights laws and their enforcement, affect health by affecting intermediate factors such as housing, employment, and transportation which, in turn, affect the distribution of health risk and protective factors, such as pathogens and environmental toxins, and the resources for prevention and treatment (Hahn 1995; Williams, Costa, Odunlami & Mohammed, 2008; Braveman & Gottlieb 2014). As argued in the *Brown v. Board of Education* ("*Brown*") decision, equitable access to societal resources assured by civil rights may also strengthen self-respect and a sense of control, sources of psychological health Clark (1971).

Perhaps the civil rights domain with the most obvious health consequences is assured equal access to health care opportunities– likely to have greatest effects on lower income families, including many racial and ethnic minority families (Williams et al., 2008; Smedley, Stith & Nelson, 2002). Equitable access to education is also essential for health equity, because it allows the development of basic knowledge, problem-solving abilities, and social-emotional skills (Hahn & Truman, 2015) that allow full participation in society (Hahn & Truman 2015; Ross & Wu 1995; Feinstein, Sabates, Anderson, Sorhaindo & Hammond, 2006). Equitable access to employment, living wages, and fair opportunity for promotion also increase the likelihood of income which, in turn, can maintain or improve health by multiple means. The location and condition of housing affect occupants' safety, distance from polluted environments, access to community resources, including transportation, food, recreation, employment, and financial institutions, as well as basic conditions of shelter (Galobardes, Shaw, Lawlor, Lynch & Smith, 2006a; Galobardes, Shaw, Lawlor, Lynch & Smith, 2006b). The quality of educational opportunity varies greatly by community income level, and residential location also powerfully affects access to educational resources and their long term health consequences Reardon and Owens (2014). Although we discuss civil rights by social domain, such as health care, education, employment, and housing, these rights are multiply interconnected Reskin (2012). Moreover, it is likely that all domains of civil rights are mutually reinforcing when in place, and mutually harmful when unenforced Reskin (2012).

A brief history of the pursuit of civil rights in the United States

In the United States, the principal roots of current and historical racial and ethnic health inequities are found in the societal distribution of resources and power that underlie long-term health. Individuals and groups with predominant power and resources divide the world into categories, such as "races"(Hill, 1996; Omi & Winant, 2014; Waldstreicher, 2010) and allocate power and resources to some groups while withholding power and resources from others, rationalized by questionable ideologies of merit, capacity, or other criteria.

From 1787–1791, the Founding Fathers rejected subjugation to British rule and established the United States government based on democratic principles. They institutionalized a Constitution and legislation that granted civil rights to people like themselves but not to others, including non-White populations and women of any race Zinn (2014). They allowed (Article I, Section 9) the importation of slaves until 1808. While some Founding Fathers held more egalitarian beliefs, the documents that framed the establishment of the nation, e.g., the Declaration of Independence and the Constitution, were compromises that excluded slaves and American Indians from all rights. White Europeans occupied land inhabited by indigenous populations—"American Indians" and profited by the enslavement of Black populations from Africa Williams (2014). These racial and ethnic minority populations were excluded from civic participation and restricted in immigration and mobility, income and employment, marriage, and more, with substantial health consequences Steckel (1986). Such legal and civic restrictions on the Black slave population continued until forcefully interrupted by the Civil War of 1861–1865. Since then, efforts have

Table 1
Major laws and court decisions related to civil rights, United States 1791 to 2015.

Legal Source (year enacted)	Judicial decision (J) or Legislation (L)	Populations covered	Major outcomes[a]
Bill of Rights (1791)	L	U.S. residents	Protection of individual rights and limitations on governmental powers
Dred Scott (1857)	J	Free and enslaved black people living in the USA	All black persons (negroes), free or enslaved, with African ancestry, are ineligible for US citizenship
13th Constitutional Amendment (1865)	L	slaves	Slaves emancipated
An Act to protect all Persons in the United States in their Civil Rights, and furnish the Means of their Vindication (1866)	L	U.S. residents	All resident populations guaranteed equal protection under law.
14th Constitutional Amendment (1868)	L	all U.S. residents	All resident populations guaranteed equal protection under law.
15th Constitutional Amendment (1870)	L	Black men	Freed Black slave men given right to vote
Plessy v. Ferguson (1896)	J	all U.S. residents	Separate but equal access to public facilities ruled legitimate
19th Constitutional Amendment (1920)	L	U.S. women residents	Women given right to vote
Indian Citizenship Act (1924)	L	American Indians	American Indians given citizenship
Shelley v. Kraemer (1948)	J	housing covenants	Enforcement of exclusive housing covenants ruled unconstitutional
Brown v. Board of Education (1954)	J	all U.S. residents	Separate but equal ruled illegitimate
Simpkins v.Moses H.Cone Memorial Hospital (1963)	J	hospitals	Hospitals receiving federal funds were no longer considered private, but as arms of the state subject to federal requirements.
Civil Rights Act 1964	L	all U.S. residents	
Key Titles			
Title I	L		Bars unequal voter registration requirements
Title II	L		Bars discrimination in public facilities engaged in interstate commerce
Title III	L		Bars government discrimination in access to public facilities
Title IV	L		Encourages desegregation of schools and advocates enforcement
Title VI	L		Bars discrimination by government agencies that receive federal funds.
Title VII, amended as Equal Employment Opportunity Act (1972)	L		Prohibits discrimination by covered employers
Title VIII, amended as Fair Housing Act	L		Requires voting data in specified regions. Prohibits discrimination in the sale, rental, and financing of homes
Title IX	L		Facilitates transfer of civil rights cases from prejudicial state courts to federal court, fostering more consistent application of laws.
Title X	L		Establishes the Community Relations Service to assist in community disputes regarding discrimination
Voting Rights Act (1965)	L	all U.S. residents	Removed requirements for voting, e.g., literacy tests, that had restricted access to voting by racial groups.
Elementary and Secondary Education Act (ESEA, 1965)	L	schools	Directed to assure equal opportunities for education to low income neighborhoods by supplementing financial resources.
Equal Employment Opportunity Act (1972), Amends CRA, Title VII	L	all U.S. residents	Expands non-discrimination policy to employers with 15–25 employees.
Financial Institutions Reform, Recovery, and Enforcement Act (1989)	L	banks	Requires banks to track not only census tracts where they made loans, but also of the characteristics of borrowers and applicants.

[a] Civil rights laws and rulings commonly designate or apply to a protected class: "A class of individuals to whom Congress or a state legislature has given legal protection against discrimination or retaliation." (https://www.law.cornell.edu/wex/protected_class).

increasingly been made (and resisted) to reverse multiple forms of unequal treatment through the enactment and enforcement of civil rights laws.

Several U.S. Supreme Court decisions and other legal milestones in civil rights history are basic to our thesis that the public health benefits of the implementation of civil rights laws can be large and long term (Table 1). In 1857, in the *Dred Scott* v. *Sandford* decision, the Supreme Court affirmed that civil rights enumerated in the Constitution did not apply to free or enslaved Black Americans because they were not citizens when the Constitution was written. In 1865, the Thirteenth Amendment made slavery unlawful and gave Congress enforcement powers.

The first civil rights law was enacted in 1866 – "An Act to protect all Persons in the United States in their Civil Rights, and furnish the Means of their Vindication." The Fourteenth Amendment (1868) established that every individual born or naturalized in the United States is a citizen, and ensured that states may not deprive a citizen or resident of civil rights, including due process of law and equal protection Chemerinsky (2006). The Fifteenth Amendment (1870) granted citizenship and voting rights to freed (male) slaves and their (male) descendants. Thus the civil rights and constitutional protections guaranteed to White Americans in the Constitution and amendments were theoretically available to Black Americans and other racial-ethnic minority Americans; for American Indians, only those not living in "Indian territories" were included. American Indians were given citizenship only in the Indian Citizenship Act of 1924.

However, the notion of equality was contested. In *Plessy v. Ferguson* (1896), the Supreme Court confirmed the "separate but equal principle"

that sanctioned segregation practices, until those practices were outlawed in *Brown* in 1954. Although segregation in education was ruled illegal, the practice persisted Fiel (2013).

Particularly in southern states, "Jim Crow" laws were enacted, legally enforcing segregated institutions and depriving Americans and others of civic participation by various means. Implementation of the Fifteenth Amendment was impeded for almost a century (1870–1970) as poll taxes, qualification tests, and other requirements limited access to the vote Zinn (2014). The Social Security Act (1935) excluded agricultural workers and domestic servants, which, at the time constituted three fifths of the Black labor force Quadagno (2000). Governmental and official law enforcement efforts to deny Black Americans their civil rights guaranteed by the Constitution persisted at least until the 1950s when, beginning with *Brown*, organized efforts to dismantle Jim Crow laws began to work. In the expansion of civil rights in U.S. history, states have played leading roles (Tarr 1990; Hudnut 1985; Brennan 1977).

Effects of civil rights law and enforcement on the health of racial and ethnic minority populations since 1950

Here we provide examples of evidence of the effects of enforcing civil rights court rulings and legislation enacted in the past 65 years in 4 domains—health care, education, employment, and housing. We chose these domains to illustrate with strong examples the effects of civil rights law on public health. Those effects are likely to also apply in other civil domains, such as justice, civic participation, and transportation. While court rulings and legislation are often refined and modified over time, we focus on the original legislation or ruling and on the research assessing its consequences. When assessed, we report health outcomes. We also report outcomes such as educational achievement, income, and employment because these outcomes are basic social determinants of health. When a social determinant of health is improved in a population, so is population health (Hahn & Truman 2015; Acevedo-Garcia & Osypuk 2008; American Public Health Association 2010; Binswanger, Redmond, Steiner & Hicks, 2012). While systematic review of this topic is needed, the goal here is to provide illustrative examples of evidence of the effects of civil rights laws on public health in recent history. We conducted searches for civil rights and health, focusing on civil rights law on each subtopic (in PubMed, Google, and Google Scholar); we also searched reference lists. We found few studies and none indicating negative health effects of civil rights laws or rulings.[2] Public health law studies have largely focused on laws explicitly addressing public health, and, published literature has not examined the effects of civil rights laws and their enforcement (Moulton et al., 2009; Gostin, Wiley & Frieden, 2015). While our hypothesis that the public health benefits of the implementation of civil rights laws can be large and long term probably applies to several racial and ethnic minority populations, most of the studies we found examined effects on black populations.

Civil rights and health care

By the mid-1960s, the Hill-Burton Act (1964) had financed the construction of hospitals in the US with almost half of hospital beds in the nation Almond, Chay, and Greenstone (2006). The Act explicitly followed the principle of "separate but equal" even after *Brown* invalidated this principle in education. It allowed jurisdictions to construct hospitals restricted to Whites as long as comparable facilities for Blacks could be demonstrated Quadagno (2000). In Alabama, Hill-Burton funds supported the construction of hospitals in 67 counties, only two of which had non-segregated services Quadagno (2000). The North Carolina case, Simkins v. Cone, 323 F.2d 959 (1963) held the "separate but equal" provision of the Hill-Burton Act unconstitutional. Studies have focused on Title VI of the Civil Rights Act of 1964 (CRA) prohibiting segregation and discrimination in hospitals receiving federal funds (Almond et al.,2006; Chay & Greenstone 2000; Krieger, Chen, Coull, Waterman & Beckfield, 2013).

Medicare (established July 1966) tied the receipt of federal funds for low income patients to non-discrimination and non-segregation, thus providing strong incentive for compliance with the CRA. Nevertheless, resistance continued in many southern states Smith (1999). Part of the resistance to desegregation took the form of claims that hospitals were private and exempt from federal regulation. Quadagno argues that it was pressure from the welfare state through Medicare and enforcement of its anti-discrimination provisions that brought hospitals into compliance with CRA desegregation principles Quadagno (2000). However, enforcement of Title VI has been partial and inconsistent Yearby (2014).

Almond et al., (2006) used national infant mortality data (an indicator of population health (U.S. Centers for Disease Control and Prevention, 2016)) to assess the association between Title VI of the CRA and infant mortality rate (IMR) trends; they focus on IMR from diarrhea and pneumonia, which account for a large proportion of hospital treatment for infants. Most changes occurred in southern states in which hospital segregation was previously widespread. In the United States overall, between 1965 and 1971, the IMR among nonWhites (approximately 99% of whom were Black) fell by 40% from 40 to 28 per 1,000 live births (Fig. 2), while the rate among Whites changed little and the nonWhite:White IMR ratio fell from 1.90 to 1.65—the largest decline since World War II Almond et al., (2006). The concurrence of the timing, abruptness of the rate changes following 1964, the sharp decline in death from infant conditions treatable in hospital settings, and the contrast with minimal changes among Whites suggests the CRA as the cause of these trends. The researchers estimate that, between 1965 and 2002, approximately 38,600 Black infant deaths were prevented by implementation of Title VI of the CRA (Almond et al., 2006; Chay & Greenstone 2000).

Using the same reasoning, the same researchers examined the childbearing outcomes among adult daughters of Black and White women born between 1955 and 1975 to assess whether the CRA was also associated with the childbearing of these women and their daughters born in the 1980s and 1990s Almond and Chay (2006). Black women born in the late 1960s were less likely to have low birthweight infants or infants with low APGAR scores (indicating poor health and the need for immediate medical care) than women born earlier, while no similar changes were found for White women. Thus, not only were Black infants born after the CRA healthier than those born before, but their next generation descendants were also healthier Chay and Greenstone (2000).

Krieger et al. (2013) confirm these findings. They classify all states prior to the CRA as "Jim Crow polities" or not, based on whether state laws legalized racial discrimination in one or more of several domains, including education, transportation, hospital and penal institutions, and employment. This classification avoids the assumption that only Southern states had segregationist policies and adds Kansas and Wyoming as Jim Crow states. The researchers find that the ratio of Black infant mortality rates in Jim Crow versus non Jim Crow states fell from 1.19 from 1960 through 1964 to 1.0 from 1970 until 2000, with no changes in similar comparisons for White infants. The finding suggests health disparities in infant mortality between states with and without Jim Crow laws were eliminated following enactment and enforcement of the CRA Krieger et al. (2013). Krieger similarly reports an association between birth in states with Jim Crow laws and rates of estrogen negative breast cancer among black, but not among white women (Krieger, Jahn & Waterman, 2017), thus again suggesting a

[2] Legal scholar, Ruqaiijah Yearby (Associate Dean of Institutional Diversity and Inclusiveness, David L. Brennan Professor of Law, and Professor of Epidemiology and Biostatistics, School of Medicine, Case Western Reserve University) reports not being aware of any studies of the public health consequences of civil rights law with either no effects or negative effects.

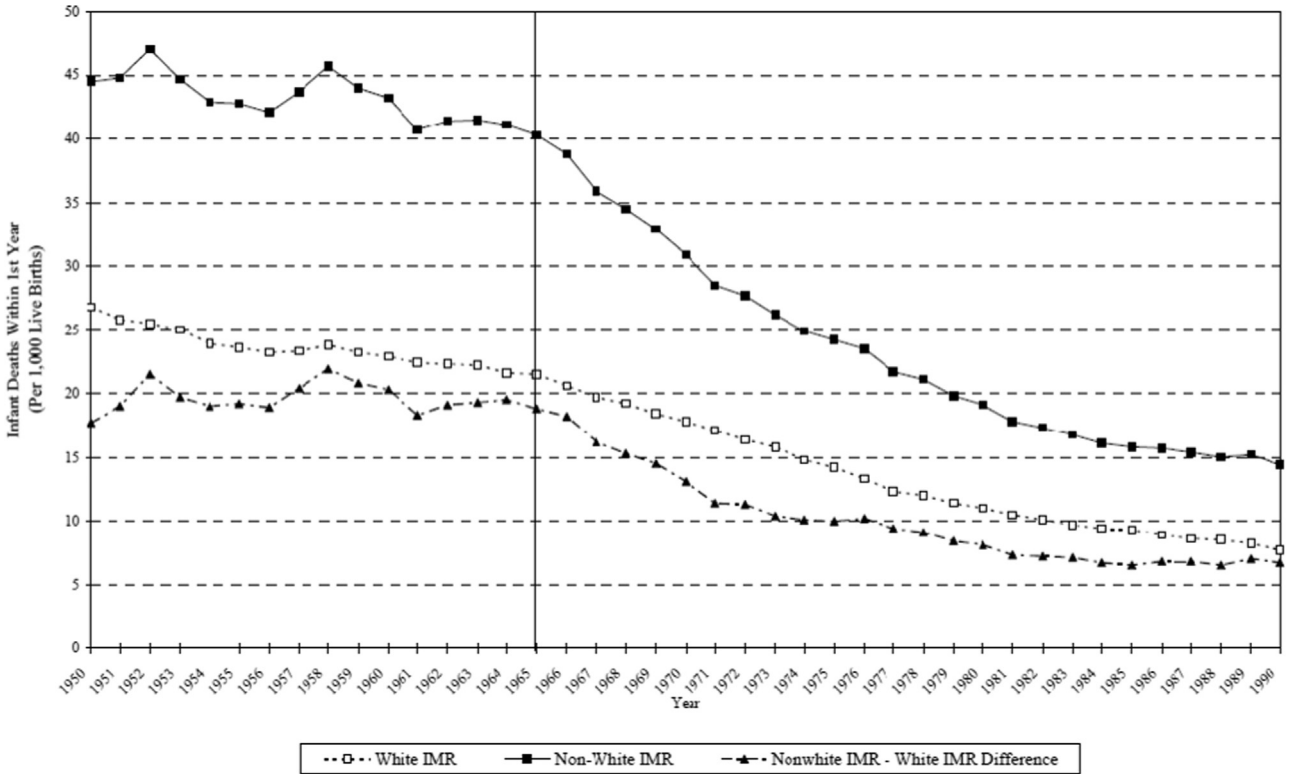


Fig. 2. NonWhite and White Infant Mortality and NonWhite and White Infant Mortality Difference per 1,000 Live Births, United States, 1950–1990 (from Vital Statistics of the United States).

negative effect of the absence of civil rights enforcement.

Available evidence suggests that the CRA greatly affected infant mortality rates among blacks previously excluded from full access to hospital resources and probably affected the health of the succeeding generation as well.

Civil rights and education

In the early 20th century, substantially different educational resources were provided for black and white children. For example, in Alabama, resources were markedly less for Black than for White students Margo (1985). Such blatant forms of discrimination in education, and specifically the concept of "separate but equal," were ruled unconstitutional in the 1954 *Brown* decision.

In a remarkable study of both the immediate and long term effects of school desegregation, Johnson (Johnson, 2011) analyzed all U.S. court school desegregation orders issued between 1954 and 1970 and their effects on children born between 1945 and 1968, assessed up to 2011. He evaluated effects on school resources, high school completion and other educational outcomes, as well as adult earnings and health. Johnson controlled for an array of potential confounding, comparing siblings exposed and not exposed (having completed school prior to desegregation) to court ordered desegregation, also controlled for policies related to the War on Poverty, and Head Start, and community political affiliations associated with segregationist policies.

Johnson found that, following the 868 school desegregation orders, there was a notable increase in school district integration; the dissimilarity index (ranging from 0—no segregation to 1—complete segregation) fell from the 1968 mean of 0.83 to the substantially lower mean of 0.20 within 7 years. Four years following the court-ordered desegregation, there was also a mean increase of $1000 in per student expenditures – principally in high proportion Black school districts.

The increase of $1000 in school funding per student was associated with "an additional 1.4 years of completed education, a 58% increase in wages, an increase of $18,635 in annual family income, a 34% reduction in the annual prevalence of adult poverty, and a 2.1% reduction in the annual incidence of adult incarceration"—among Black students, with little change for White students. Finally, the gap in adult self-assessed health status between Blacks and Whites was reduced by between one third and one half.

Johnson also finds that, for each year that a Black student spends in a desegregated school, the student is 2% more likely to graduate from high school. Thus, exposure to desegregated schools for 12 years would be expected to result, on average, in a 24% (i.e., 2%/year over 12 years) increase in the likelihood of graduation–approximately equivalent to the gap in Black and White graduation rates during the study period Trends (2013). Thus, it is possible that much of the infamous gap between Blacks and Whites in academic achievement is attributable to school segregation and that countering segregation is part of the solution to this persistent and consequential problem. It is estimated that in the year 2000, compared with those with a high school education or more, failure to complete high school was associated with between 23% and 81% greater likelihood of death per year Galea, Tracy, Hoggatt, DiMaggio, and Karpati (2011).

There was little change in school segregation following *Brown* until the late 1960s, followed by a substantial decline in segregation at least until the mid-1980s Reardon and Owens (2014). In recent decades, the Executive Branch of the federal government, and in particular, the U.S. Department of Education and its Office of Civil Rights, have increasingly limited their efforts in promoting school desegregation (Le Chinh, 2009; Epperson, 2008), thus slowing the potential contributions of desegregation to the health and well-being of many racial/ethnic minority students.

Civil rights and labor, employment

Title VII of the CRA of 1964 made it illegal for employers to "fail or refuse to hire or to discharge any individual, or otherwise to

discriminate against any individual with respect to his compensation, terms, conditions or privileges or employment, because of such individual's race, color, religion, sex, or national origin." Establishments and firms with ≥100 employees were covered as of July 2, 1965; covered entities were incrementally expanded until, in 1972, the Equal Employment Opportunity Act amended Title VII to add establishments and firms with 15–25 employees. While most states had already adopted their own anti-discrimination regulations, this was not the case in eight southern states.

Chay (1998) assessed the effect of the 1972 addition of the 15–25 employee category on the relative employment and wages of Black men compared with White men in southern and northern states. Following enactment of the new requirements, the relative employment of Black men increased by between 0.5% and 1.1% per year more rapidly than prior to the new law, as did the range of their occupations and their wages.

Similarly, Kaplan, Ranjit, and Burgard (2008) assessed the consequences of anti-discrimination provisions on employment opportunities, wages, and life expectancy of Black women from 1950 to 1980. The researchers analyzed trends before and after 1964 and compared northern and southern states. The proportion of Black women reporting household service work in southern states declined from > 50% to < 20%, and, by 1980 the proportion of Black women reporting white-collar employment had increased by approximately 200% in the south and 300% in the north. In contrast, white-collar employment among White women increased by 17% in the south and 7% in the rest of the nation Kaplan et al. (2008). Similarly, while in 1960, the wages of Black women were 64% of those of White women, by 1980, wages were almost equal. From 1966 through 1975, life expectancy for a Black woman aged 35 years increased 2.6 years, while that of White women increased only 1.5 years.

Major trends and contrasts in employment, occupational levels, and wages centered on 1964, the year of the CRA, are consistent with the hypothesis that the CRA substantially benefited the employment opportunities and long term health of Black men and women. Employment is a recognized predictor of self-assessed health (Ross & Mirowsky, 1995) and a strong indicator of long term health and mortality (Idler & Benyamini); unemployment is a risk factor for mortality Roelfs, Shor, Davidson, and Schwartz (2011).

Civil rights, place of residence, and home ownership

Housing is a basic human need, providing shelter and, with home ownership, investment and security. In addition, the location of one's home is a major determinant of access to community resources, including safety and recreation, food and other material goods, and transportation, employment, and education which are themselves social determinants of health. Through multiple causal pathways, the quality, location, and value of housing are major determinants of health Acevedo-Garcia and Osypuk (2008). However, while laws prescribe standards of non-discrimination, implementation has been minimal and inconsistent.

The Civil Rights Act of 1866 had guaranteed each male citizen an equal right "to inherit, purchase, lease, sell, hold, and convey real and personal property," and the Fourteenth Amendment affirmed equal rights under law. Fulfillment of these rights was long delayed. Realtors, licensed by the states to control the acquisition of housing, are responsible for informing, showing, and assisting in the purchase of available homes, as well as in the procurement of mortgages. At each phase, realtors may facilitate or restrict access to desirable housing by clients of different racial and ethnic backgrounds. Until at least 1950, the manual of the National Association of Real Estate Brokers, recommended that:

> "The realtor should not be instrumental in introducing into a neighborhood a character of property or occupancy, members of any race or nationality or any individual whose presence will clearly be detrimental to property values in the neighborhood" (United States Commission on Civil Rights, 1973).

Realtors thus enforced "restrictive covenants"—agreements among residents of communities that explicitly excluded racial and ethnic minority or foreign-born residents. In 1917, the Supreme Court declared these agreements unconstitutional (*Buchanan* v. *Warley* 245 US 60, 38 S. Ct. 16, 62 L. Ed. 149); however the practice continued. The mortgage insurance program promoted by the Federal Housing Administration, established in 1934, advised, "If a neighborhood is to retain stability, it is necessary that properties shall continue to be occupied by the same racial classes." In 1973, the U.S. Commission on Civil Rights (United States Commission on Civil Rights, 1973) described the realty enterprise as a process "in which the Government and private industry came together to create a system of residential segregation," a finding recently documented in detail Rothstein (2017). In 1948, in *Shelley v. Kraemer*, the Supreme Court declared that enforcement of these agreements was unconstitutional United States Commission on Civil Rights (1973). However, as of 1973, subsequent studies indicated that, "Blacks have made very little progress in reducing segregation in housing since … *Shelley v. Kraemer*" (United States Commission on Civil Rights, 1973).

Additional federal laws and Supreme Court decisions that established expanded opportunities for fulfillment of civil rights regarding housing have also been minimally enforced. The Fair Housing Act (Title VII of the CRA of 1968) "…prohibited discrimination on the basis of 'race, color, religion, or national origin' in the sale or rental of housing, the financing of housing, or the provision of brokerage services" (Feder, 2003). Supreme Court case *Jones* V *Mayer*, 1968, extended coverage of the prohibitions to private properties. The U.S. Department of Housing and Urban Development (HUD) was established in 1965 to promote housing and urban development "in a manner affirmatively to further the purposes of fair housing." HUD conducts periodic surveys of discrimination in the acquisition of housing by the race, ethnicity, and other characteristics of potential purchasers or renters. Black, Hispanic, White, and Asian interviewers pose as renters or purchasers with equal qualifications; they record available housing they are informed of or shown. In the most recent survey (2012), Black interviewers were informed of 17% fewer homes and shown 17.7% fewer homes than Whites Turner (2013). Asians were informed of 15.5% fewer homes and shown 18.8% fewer homes. Similar findings were reported in 1977 Wienk (1979).

Housing civil rights enforcement actions may be brought by the Attorney General, HUD, or plaintiffs. Only a miniscule proportion of instances of housing discrimination are investigated or remedied. Most instances of racial discrimination occur with impunity. Simonson (2004) estimates that approximately 1,760,000 incidents of discrimination against Black home-seekers occur annually. HUD investigates several thousand claims of racial discrimination and initiates several suits annually; in 2014, there were fewer than 4,000 claims brought for racial discrimination (US Development UDoHaU, 2014) — about 0.2% of Simonson's estimate. In *Hills, Secretary of HUD* v. *Gautreaux et al.*, the Supreme Court ruled in 1976 that: "…HUD has been judicially found to have violated the Fifth Amendment and the Civil Rights Act of 1964 in connection with the selection of sites for public housing …" (United States Supreme Court., 1976). Overall, Black home ownership in the U.S. is 25% lower than of that of Whites and the gap increased slightly from 1970 to 2001; only among those with the highest income did the gap decrease (from 13.9% to 11.9%) Herbert (2005).

HUD has been repeatedly sued for failure to effectively pursue its own fair housing mandates Ellen and Yager (2015). The *Gautreaux* decision required the Chicago public housing authority to give vouchers to qualified recipients of public housing benefits in low income, segregated areas of Chicago. Participants who moved to higher income

suburbs were more likely to be employed and their children had improved educational outcomes Rosenbaum and Zuberi (2010). Better-designed studies of programs such as Moving to Opportunity have found benefits for low income recipients—including improvements in housing, employment, and reductions in obesity, diabetes risk, and alcohol abuse (Sanbonmatsu et al. 2011; Fauth, Leventhal & Brooks-Gunn, 2004; Ludwig et al., 2011).

Three recent events indicate crucial opportunities for increased civil rights in housing. In the *Texas Department of Housing and Community Affairs v. The Inclusive Communities Project, Inc. (135 S. Ct. 2507 (2015))* case, the Supreme Court affirmed the purpose of the Fair Housing Act as the advancement of racial integration, and chastised federal and local governments for exacerbating rather than remedying residential segregation Roisman (2015). The Court ruled that disparate impact discrimination violates the Fair Housing Act and noted: "Much progress remains to be made in our Nation's continuing struggle against racial isolation." Similarly, the Obama administration announced efforts to strengthen and enforce federal fair housing policies forbidding residential discrimination in the location of public housing projects Davis and Applebaum (2015). Finally, HUD's Plan for 2014-8, noting that "housing discrimination still takes on blatant forms in some instances," indicated as one of its objectives to "reduce housing discrimination, affirmatively further fair housing through HUD programs, and promote diverse, inclusive communities" (US Department of Housing and Urban Development, 2014).

Discussion

Examination of consequences of the historical denial of the civil rights of racial and ethnic minority populations and the effects of civil rights laws, Supreme Court decisions, and implementation, including enforcement actions to right those wrongs, indicates that civil rights can be a powerful social determinant of health. Deprivation of civil rights has been a prominent factor in the poor health of Black people in the United States. Protection of civil rights of racial and ethnic minorities by laws, regulations, and court decisions and redress of violations of those rights have been associated with marked improvements in the health of covered populations and of intermediate outcomes such as education and income known to produce health benefits.

However, also clear from evidence showing the limited consequences of housing civil rights legislation, public health benefits depend not only on the *existence* of civil rights and regulations, but on their *implementation*, including their *enforcement*. Unless implemented, civil rights are promises without benefit. While the scope of efforts to protect civil rights has greatly expanded in recent history, evidence presented here and elsewhere (Reskin, 2012; Smith, 1999; Chemerinsky, 2002) shows that enforcement of civil rights has been uneven and incomplete, and, at least in domains of health care, education, and housing, resistance to civil rights laws and their implementation persists.

The public health benefits of civil rights implementation can be large and long term. Civil rights thus may be considered a productive arena for public health theorizing, research, policy, action, and practice. Systematic evaluation of the health consequences of civil rights law and surveillance of law enforcement and its consequences will expand basic knowledge. As public health promotes food safety and seat belts, the public health community can also promote fair housing and school desegregation for public health. The public health community has the opportunity to collaborate with agencies responsible for the enactment and enforcement of civil rights, promoting civil rights as a means of advancing public health and reducing health inequities.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Ethical statement

This study did not involve subject participation or ethical issues.

Conflict of interest

There are no conflicts of interest in this study.

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Legal Battle Against Discrimination In healthcare

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The Oxford Handbook of U.S. Healthcare Law
Edited by I. Glenn Cohen, Allison K. Hoffman, and William M. Sage

Subject: Law, Medical and Healthcare Law, Law and Society
Online Publication Date: Aug 2015 DOI: 10.1093/oxfordhb/9780199366521.013.9

Abstract and Keywords

This chapter discusses the existence of racial and ethnic discrimination in U.S. healthcare. It highlights the adverse effects on health outcomes of both the discrimination of the American slavery and Jim Crow eras, as well as the more subtle form of racism prevalent in healthcare today. It first contextualizes racism in American healthcare and the legacy of discrimination in medicine before turning to federally enacted legal instruments currently used to address discriminatory healthcare, along with their shortcomings. It then considers the Supreme Court's response to contemporary trends in racial discrimination. It also suggests that Congress has been remiss in its responsibility to set the nation's modern civil rights agenda and explains why. Finally, the chapter outlines concrete steps toward achieving nondiscriminatory healthcare delivery in America, mainly through legislative amendments to reform the existing civil rights law.

Keywords: ethnic discrimination, healthcare, slavery, Jim Crow, racism, Supreme Court, racial discrimination, Congress, civil rights, Title VI

Healthcare is unique among American industries because historically institutionalized, overt racial and ethnic segregation—primarily enforced by hospitals—ended quietly and seemingly overnight. Without marches, sit-ins, or growling dogs and fire hoses ripping at the backs of civil rights protestors, sometime soon after 1964, hospitals compliantly took down their "whites-only" and "colored-only" signs. Somewhere in the dead of night, orderlies wheeled black and white patient beds onto the sidewalk, shuffled them together, and returned them to ostensibly integrated hospital rooms. The motivation for this "voluntary" desegregation was money. The mechanism that communicated the motivation was a new law—Title VI of the Civil Rights Act of 1964.

The battle for health desegregation was fought in the courts and the halls of Congress, rather than in the streets. Under the newly enacted antidiscrimination law, Congress threatened to withhold federal Medicare and Medicaid reimbursement funds from any

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person or institution, which, “on the ground of race, or national origin,” discriminated or denied benefits “under any program or activity receiving Federal financial assistance.”[1] By 1966, nearly 20 million Americans over age 65 were Medicare enrollees; medical providers did the math and quickly determined that overt segregation in healthcare did not pay. But minority patients and their physicians soon learned that achieving facial desegregation of hospitals was only a partial and temporary victory.

Title VI exempted physicians from compliance. Nursing homes largely escaped the antidiscrimination law’s coverage, and therefore, in these institutions, discrimination continued to flourish. Even where hospitals were concerned, their apparent acquiescence to integration did not mean an end to race discrimination. In fact, Medicare hospital discharge data reveals that in many areas of the country, racial and ethnic segregation persists to this day.[2] Moreover, today, a scant fifty years after the civil rights law’s passage, discrimination against patients of color, based solely on their race or ethnicity continues to cause black, Latino, and Native American patients to live sicker and die quicker than white patients in this country. This chapter confronts the evidence that health inequality is medically unjustifiable, entirely avoidable, and arguably illegal.

In doing so, it is important to properly frame the problem. Health inequality refers to differences in access to and the quality of healthcare, not due to clinically appropriate differences or patient preferences. These differences are the result of discrimination at the patient, provider, and institutional levels,[3] and they produce inferior health outcomes in vulnerable populations called “health disparities.” By definition, two forms of healthcare discrimination are *not* considered here. This chapter is not about clinically driven differences in medical care. For example, when providers include sickle cell anemia or Crohn’s disease in the differential diagnosis for patients of one ethnic group but do not consider these illnesses for patients of another ethnic group for whom the disease prevalence is rare, inequality is not implicated. This discrimination is medically supported and not of concern. Second, the discrimination problems discussed here are not the result of overt bigotry. The malicious discrimination that grows out of a genuine and intentional belief that one people group is inherently inferior to another is no longer the major source of discrimination in American healthcare. Therefore this form of racism is not the focus here. However, the invidious racial hatred that characterized American healthcare at the nation’s inception has left a legacy that is at the heart of this chapter. The inequality that plagues our healthcare system today resembles its predecessor because it is historically driven, structurally reinforced, and systemically operationalized. Both the discrimination of the American slavery and Jim Crow eras, and the more subtle form of racism prevalent in healthcare today impose injuries to health and healthcare through individual and institutional conduct. By adversely affecting health outcomes, both forms of discrimination deny people an equal opportunity to participate in

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education, employment, recreation, and a healthy life, based on their ethnicity or skin color. Both cut short the lives and life chances of those who are not white, merely because they are not white. And yet the forceful legal prohibitions of America's federal antidiscrimination laws forbid only the overt forms of discrimination that seldom find expression in modern America. Federal law apparently ignores the pervasive prejudice that devalues minority lives daily throughout the healthcare system. This chapter outlines concrete steps toward achieving nondiscriminatory healthcare delivery in America.

The chapter begins by contextualizing racism in American healthcare. The legacy of discrimination in medicine is historically rooted and costly in terms of lost productivity, increased healthcare costs, and the number of minority lives that are cut short due to health disparities. Next, the chapter explains the federally enacted legal tools currently available to address discriminatory healthcare, and the ways in which they fall short. The focus in this chapter is on the federal law known as "Title VI." Although this statute was inspired by the need to address explicit, hate-driven racial discrimination, the text of the law has not changed since 1964, and the interpretation of the law has narrowed, while racial and ethnic discrimination in American healthcare have shifted and arguably expanded dramatically. The following section describes how the U.S. Supreme Court has responded to contemporary trends in racial discrimination and suggests that the struggle for the soul of antidiscrimination law appears to have moved from the federal legislature to the Supreme Court. Congress appears to have abdicated its responsibility to set the nation's modern civil rights agenda. The third section of the chapter explains why. American lawmakers' efforts to combat health inequity are confounded by a transformation in healthcare from "old-fashioned" discrimination rooted in racism and overt bigotry, to subtle discrimination resulting from implicit racial bias. The shift has allowed unconscious racism to pervade healthcare delivery but escape the law's notice. The chapter concludes with suggested legislative amendments to reform an ineffective civil rights law that currently fails to control discrimination in healthcare and other publicly funded sectors of the economy.

While the focus here is on racial and ethnic discrimination, compelling evidence suggests that health providers also discriminate against patients based on gender, physical disabilities, sexual orientation, and mental health status. However, while these forms of prejudice and the harms they cause are beyond the scope of this chapter, much of the discussion here supports the claim that none of these violations should be beyond the reach of the law in a nation committed to equality. The cost of discrimination is high and climbing. While showing this to be the case for racial and ethnic discrimination, the reader should be mindful that health discrimination against *any* minority population is deadly and dead wrong.

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I. The Legacy of Discrimination in American Healthcare

Racial and ethnic discrimination in healthcare has been a part of the American historical fabric since the founding of the confederacy. African slaves brought to American shores were thought to warrant and therefore received the quality of medical care afforded to livestock, as colonists protected their financial investments in people they regarded as property. Copious historical records document the filthy shelters where slaves lived, and the limited medical treatment they received. Most owners provided medical treatment for slaves when motivated principally by the need to return the afflicted workers profitability as quickly as possible.[4] As institutional healthcare emerged, so did separate and unequal access to American medicine. Although the nation's first inpatient hospital, built in 1751 to provide charitable care for the poor and insane, initially served patients from all racial backgrounds, records show that by 1825, the Pennsylvania General Hospital, admitted black patients only into segregated wards, giving the facility its designation as "Anglo-America's First Hospital."[5]

From the beginning, Americans of European ancestry received superior healthcare as compared to all others who shaped our country. Native Americans who lacked immunological protections against European-borne illnesses such as smallpox, measles, and influenza, suffered egregiously from the new forms of disease the settlers introduced. Their mortality rates increased to "catastrophic" proportions after Columbus and the colonists arrived. Even more devastating, crowded and unsanitary living conditions on the reservation system imposed between the 1830s and 1870s, concentrated and isolated the diseased, and quickly decimated the Indian population. Episodic appropriations bills produced an inadequate Indian healthcare system that shifted the burden on this population from acute, communicable diseases, to chronic infections such as malaria, venereal diseases, tuberculosis, consumption, scrofula, and alcoholism. Thus the seeds of the 500-year-long problem of American Indian health disparities were sown.[6]

Chinese workers who arrived as laborers during the American Industrial Revolution suffered an affirmative brand of racial discrimination in healthcare. For example, in May 1900, the San Francisco Board of Health passed a resolution requiring that *only* the city's 25,000 Chinese residents submit to a "Haffkine Prophylactic" vaccine or be quarantined to prevent the spread of bubonic plague. The plague, it turned out, was conjecture, the vaccine was harmful, and the city's resolution was ultimately held unconstitutional.[7] Still other laws directed toward the Chinese immigrant community forced them to live in

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prescribed ghettos, where overcrowded and unsanitary conditions provided a vector for communicable diseases.[8]

Mexican laborers working to build American railways during the early 1900s were also early recipients of affirmatively discriminatory American healthcare. In 1916, twenty-six people, twenty-two of whom were Mexican railroad workers, contracted typhus. The five typhus victims who died were all Mexican. As a result, the Mexican community became the target of intrusive hygiene inspections and an aggressive educational and sanitation campaign, because they were declared, as a people group, "pathogenic."[9] State-sponsored efforts at containing the typhus epidemic simply overlooked unsanitary living and unhealthy working conditions the workers endured. This irony of this discriminatory public health effort prompted one group of Mexican workers to write a letter objecting not only to the "offensive and humiliating" treatment they received at the hands of health inspectors but also to wages too low "for the nourishment of one person," the lack of adequate bathroom facilities, the location of overtaxed bathrooms near cooking and sleeping areas in their camps, and "many other details which compromise our good health and personal hygiene."[10]

Unsurprisingly, the historical legacy of discriminatory healthcare has resulted in persistently inferior health outcomes for African, Asian, Latino, and Native American patients when compared to their white counterparts. These health disparities are rooted in structural inequalities beyond the healthcare system. But the structural inequalities that minority Americans face are exacerbated by the discrimination they experience within the healthcare system. The data that confirms health and healthcare disparities is widely reported and affects racial and ethnic minorities across all major disease modalities.[11] The Institute of Medicine's 2003 report titled *Unequal Treatment* remains the most comprehensive review of literature documenting racial and ethnic health disparities.[12] However, the data documenting persistent and pervasive health disparities continue to grow. Recounting a few examples here will help describe the broad scope and impact of the present-day healthcare discrimination problem in America.

II. Racial and Ethnic Health Discrimination Today

Heart disease is the leading cause of death in the United States. Although mortality rates due to heart disease and stroke are decreasing, they remain highest among African American and Latino populations. Indeed, the prevalence rate of hypertension in black American adults is the highest in the world,[13] and African Americans are two to three

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times more likely to die from heart disease than whites. Yet the disturbing fact is that "people of color are far less likely to receive effective treatment and have less frequent access to newer and more costly invasive procedures such as cardiac catheterization, percutaneous coronary intervention, coronary artery bypass graft, implantation of defibrillators," and other treatments that represent the highest quality of care.[14]

Cancer incidence and death rates vary considerably across patients of different racial and ethnic groups. However, for all four major cancer sites (lung, colon, breast, and prostate), and for all cancer sites combined, African American men have a 14% higher incidence rate and a 33% higher death rate than white men. Black women, on the other hand, have a 16% higher death rate for all cancers combined, though they have a 6% lower incidence rate. Generally, other racial groups suffer a lower incidence and death rate from cancer than blacks and whites, but this is not the case for cancers associated within infectious agents such as uterine, cervix, stomach, and liver cancers where the incidence is generally higher in all minority populations than among whites.[15] All minority populations are more likely than non-Hispanic whites to be diagnosed at later stages of the disease than whites for all four major cancer sites. Discriminatory access to cancer care, and the inferior quality of healthcare that minority patients receive, both play a major role in cancer outcome disparities. The impact of discriminatory healthcare is confirmed by the data on cancer survival rates, particularly for black patients. The five-year survival rate for cancer is lower among blacks than for whites for every stage of diagnosis, for nearly every type of cancer; these outcomes are not due to differences in comorbidities but are due to the fact that access disparities mean that black patients are less likely to receive early diagnosis when cancers are localized. Blacks are not only less likely to receive standard cancer treatments than whites, they also generally receive less extensive treatments. Studies show that African Americans who get cancer treatment and medical care similar to the care that white Americans receive experience similar outcomes.[16] In short, discriminatory treatment for minority cancer patients is deadly.

The story is the same across a vast array of medical conditions. Although minorities have a lower incidence of mental illness than whites, black children enjoy less access to high-quality mental healthcare than children of other races.[17] Studies show that 37.6% of whites receive care when diagnosed with a need for mental health or substance abuse treatment, but only 22.4% of Latinos and 25% of African Americans[18] receive treatment.[19] Blacks are less likely than whites to receive or even to be told about the option of a kidney transplant, the treatment for renal failure, though they represent a disproportionately large number of patients with end-stage renal disease.[20] The prevalence of asthma among children in the United States is highest among Puerto Rican children (16.5%), non-Hispanic black children (16%), and American Indian and Alaska Natives (10.7%), and lowest among Asian (6.8%), Hispanic children overall (7.9%), and

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non-Hispanic white children (8.2%). Minority children miss school more often, exercise less often, and are four times more likely to die due to asthma than white children.[21]

Notably, not all of the costs that discriminatory healthcare imposes upon individual patients are plain to see. Notwithstanding some improvements narrowing disparate life expectancy and infant mortality gaps, the immediate consequences of racial and ethnic health disparities include higher morbidity and mortality rates, decreased access to medical goods and services, and decreased quality of life for the patients who are not afforded equal access to healthcare. However, discrimination visits significant harms upon minority patients even beyond these burdens. Minority patients report that perceived discrimination is a stressor that increases their distrust of the healthcare system.[22] Their mistrust leads these patients to delay seeking further medical care, and decreases the likelihood of adherence to treatment recommendations. These outcomes further decrease minority access to care and ultimately lead to an underutilization of the healthcare system. Several studies demonstrate that perceived discrimination also increases patients' feelings of depression and hopelessness generally,[23] and leads to adverse birth outcomes of African Americans when compared with other racial groups.[24] Emerging evidence also indicates that discrimination is related to physiological changes in minority patients such as increased blood pressure, higher incidence of cardiovascular disease, and immunological compromises.[25] Also, considerable evidence suggests that discrimination perceived by minority patients is associated with increased risk of cigarette smoking, alcohol use, and abuse of prescription and illicit drugs.[26]

Economists have aggregated these individual impacts to quantify the cost to society that discrimination in healthcare imposes.[27] Estimates include the loss of productive human capital calculated in years of potential life lost, the loss of days away from work estimated from occupational health statistics, and the increased costs of medical care, including "excess" hospital admissions and delayed treatment for chronic illness in a sicker population.

It is well understood that lower socioeconomic status is related to poor health and health treatment for patients of *all* races. Thus, the intersectionality between poverty and poor health worsens the risk of discrimination in the healthcare system for racial and ethnic minorities. For example, black and Hispanic Americans suffer the highest poverty levels, lowest net worth, and lowest educational achievement levels of all racial groups in America. Thus, there is a significant correlation between their race and socioeconomic status that influences the discrimination that these groups suffer due to their poverty.[28] However this fact must not confuse or diminish the impact that discrimination solely due to racial or ethnic status has in producing health disparities for at least two reasons.

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First, because most racial minorities are overrepresented when compared to whites among the poor, they bear a disproportionate burden of socioeconomic discrimination when compared to whites. As a population group, minorities are also disproportionately represented among those who have lower wealth and education than whites, though Asian Americans are the exception to this rule. Second, the empirical record confirms that race and ethnicity are independelty associated with poor health outcomes, at all socioeconomic leves. Studies continue to show that race and ethnicity independently predict poor health outcomes when disaggregated from confounding socioeconomic factors. Indeed the differences in the quality of healthcare and health outcomes are greater across racial groups than they are among socioeconomic levels within each racial group for minorities, but the reverse is true for whites.[29] In other words, as their income increases, whites enjoy dramatically better health and healthcare, while improvements in socioeconomic status for minorities offers diminishing returns, primarily because their race continues to be a dominant determinant of the quality and quantity of healthcare they receive. Discrimination in healthcare based on poverty is indeed objectionable and harmful. Certainly, policy solutions addressed at reducing the social gradient that associates low socioeconomic status with poor health outcomes will improve minority health and health outcomes as well as the outcomes that whites experience. Nevertheless, these solutions will have no impact on the problem of racial and ethnic discrimination in healthcare or the disparately poor outcomes associated with this prejudice. Therefore, the remainder of this chapter focuses on the form of discrimination that the American legal system aspires to prohibit: discrimination against patients based on their race, color, or national origin.

III. Federal Antidiscrimination Law—Past, Present, and Future

Title VI of the Civil Rights Act of 1964 provides that “[no] person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.”[30] Title VI was designed to further the U.S. Constitution’s prohibition against denying to any person the equal protection of the laws. However, over time, an individual’s right to bring suit for equitable and legal relief under this law has been cut off, and intent has been elevated to become an essential part of the constitutional violation. Section 601 of Title VI has been read to prohibit disparate treatment—that is intentional discrimination under any program or activity receiving federal funds. The current Supreme Court reads Section 602 of Title IV to give sole

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authority for enforcing disparate impact claims that do not require proof of intent, to federal departments and agencies "authorized and directed to effectuate the provisions of [Title VI]" but not to individual litigants.[31] These narrow readings of the Title VI statute are unfortunate, first and foremost because they defy the legislative language and intent of the 88th Congress, which enacted the Civil Rights Act of 1964, and second because they ignore completely that racial discrimination has taken a new but no less invidious form in this country.

According to the legislative history of Title VI statute, addressing healthcare inequity was central to Congress' purpose. The civil rights statute's proponents repeatedly cited a hospital desegregation case in their speeches advocating for the new law. The watershed case was *Simkins v. Moses H. Cone Memorial Hospital*.[32] The *Simkins* plaintiffs were black physicians, dentists, and patients who challenged racial segregation in a hospital that received public funds under the Hill-Burton Act. The Fourth Circuit had held that the separate but equal language in the Hill-Burton Act was unconstitutional and on March 2, 1964, three weeks before the bill proposing Title VI came before the full Senate for debate, the Supreme Court denied certiorari to the defendant hospital in *Simkins*. The Court let stand the Fourth Circuit's condemnation of discrimination in the "massive use of public funds and extensive state-funding," and thus its justification for the holding in *Simkins*: "But we emphasize that this is not merely a controversy over a sum of money. Viewed from the plaintiffs' standpoint, it is an effort by a group of citizens to escape the consequences of discrimination in a concern touching health and life itself.... Such involvement in discriminatory action it was the design of the Fourteenth Amendment to condemn."[33] Senator John Pastore of Rhode Island cited *Simkins* with approval as he argued passionately for passage of Title VI: "The Supreme Court declined to review [*Simkins*]; so it is the law of our land.... That is why we need title VI of the Civil Rights Act, H.R. 7152—to prevent such discrimination where Federal funds are involved. Title VI intends to insure once and for all that the financial resources of the Federal Government —the commonwealth of Negro and white alike—will no longer subsidize racial discrimination."[34] Succinctly, another proponent said, "Title VI rests on the principle that 'taxpayers' money, which is collected without discrimination, shall be spent without discrimination.'"[35]

It is plain that at the time the civil rights law was enacted, Congress intended to grant a right of private enforcement to plaintiffs who claimed to suffer any form of discrimination in order to prohibit the scourge "once and for all." Indeed, until 2001, the U.S. Supreme Court had repeatedly, though not consistently, construed Title VI to prohibit both intentional and unintentional discrimination.[36] However, the Supreme Court has progressively eroded the protections against unintentional discrimination, and circumscribed the private cause of action under Title VI. The Supreme Court's narrow

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reading of Title VI visits particular harm upon minority patients in the American healthcare system because copious empirical evidence demonstrates that the racial and ethnic discrimination that produces health inequality arises most often from unintentional and unconscious discrimination, rather than from the legally prohibited intentional bigotry.

a. The Nature of Discrimination in American Healthcare

Studies show that most Americans are not overt racists. Physicians, hospital administrators, nurses, respiratory therapists, technicians, and the host of people who provide healthcare today are no exception to the national trend away from explicit racial prejudice. Moreover, health providers are members of a profession trained to deliver care dispassionately and committed to “first, do no harm.” Therefore, the persistence of racial discrimination and health disparities in medicine requires an explanation. The scientific evidence points to the fact that discrimination has changed from conscious to unconscious forms of racism in medicine, in the same way that discrimination has evolved in other aspects of society. Healthcare providers, like employers, law enforcement officers, judges, and juries, today discriminate against minority patients unintentionally, based on unconsciously and implicitly held biases rather than based on explicit and intentionally malicious bigotry. While the evidence of implicit racial bias in other settings is well developed, the evidence of unconscious racism in healthcare is only recently emerging. Yet social scientists, relying on the science of implicit social cognition, have amassed a sufficient record to compel legal attention to this new form of invidious discrimination in healthcare.

Racism due to implicit bias is especially dangerous because it is ubiquitous and operates surreptitiously in contradiction to a person’s sincerely held nonprejudiced beliefs. An implicit bias is a negative attitude that develops over time about a group of people. Implicit biases are developed subconsciously, as individuals gather knowledge about a particular social group from their environment and cumulative life experiences. Everything from the music we hear, to conversations held in our homes, schools, and places of worship, to news, political, or sports programs, to the experiences we have or that our peers report, to motion picture, television, and media representations of minorities—all constitute a lifetime of experiences that contribute to unconsciously stored information about racial and ethnic minorities. Gradually, this stored social group knowledge becomes the information that our brains are unconsciously triggered to retrieve as stereotypes when we encounter and identify a person of a different race. In this way, negative implicit biases are automatically activated to become negative stereotypes, prejudice, and ultimately discrimination without any intentionality on the part of the actor. The key finding that research has consistently shown is that implicit

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biases can directly contradict explicit personal preferences and more powerfully influence behavior and judgments than firmly but expressly held egalitarian principles. This explains how well-intentioned, fair-minded individuals can be responsible for discriminatory behavior. Implicit racial and ethnic biases operate unconsciously but dominate the choices we make when we interact with members of different racial and ethnic groups.

Social scientists can quantifiably measure implicit racial biases. Although the method is not without controversy and limitations, the Implicit Association Test (IAT) has become the tool of choice for measuring implicit bias. The IAT is a computer-based test that measures the time a person takes to associate words with photographs. The test asks subjects to quickly pair positive words such as “pretty,” “nice,” or “clean” with photographs of phenotypically African- or European-American faces. The test measures the time a subject takes to make associations between words that are positive, and photographs of white, black, and Hispanic faces to produce a score ranging from –2 to +2. Based on the principle that people more quickly associate photographs with words that are consistent with their implicitly held beliefs about those pictures, a low IAT score is interpreted as a pro-black implicit preference, a high IAT score is interpreted as a pro-white implicit preference, and a person who scores an IAT of zero is interpreted as having no implicit racial preference between the two groups.[37] Using the IAT, researchers have confirmed that the majority of both physicians and patients have measurable implicit preferences for whites over blacks and non-white Hispanics. Researchers have known for some time that physicians discriminate in favor of whites and men as compared to blacks and women in their treatment decisions. A 1999 study of how doctors treat patients with cardiovascular disease famously demonstrated this discrimination.[38] However the evidence that physicians are not generally overt racists seemed to contradict these findings. The ability to measure unconscious racism using the IAT has shed considerable light on these dichotomous findings. Studies such as those summarized in the following section show that physicians and patients’ implicit racial and ethnic biases appear to operate before, during, and after the clinical encounter between doctors and patients to profoundly influence the quality of healthcare that minority patients receive, and therefore the quality of health they experience, notwithstanding the good and egalitarian intentions to which most healthcare providers expressly adhere.

i. Physicians and Implicit Bias

Physicians and other healthcare providers are particularly susceptible to unconscious discrimination arising from their implicit biases. Unconscious racism pervades settings in which actors must make important, discretionary judgments under conditions of uncertainty and time pressure, with access to limited information. Medical decision-making occurs in just such a setting. Moreover, sorting clues into categories helps all of

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us make sense of the complexity we encounter in our daily lives; this adaptive behavior helps us to cross the street safely avoiding fast cars, remember to dress appropriately for the weather, and use caution when we encounter unfamiliar situations, for example. In medicine, this sorting function is especially important to the process of identifying the correct explanation for a person's illness and determining the best treatment to resolve a patient's complaint. However, these seemingly innocuous applications of making implicit judgments turn into odious discrimination when they systematically involve inequitable treatment of minority as compared to white patients.

The most often studied question in this field is whether physicians, because of their implicit biases, prescribe inferior treatments to minority patients than to white patients. The evidence cuts both ways. In one study, physicians watched videos of black and white actors dressed as patients, each relating the same personal history and medical information. They described their coronary artery disease. When the doctors were asked to make a treatment decision, the researchers found that those doctors with high IAT scores—showing stronger pro-white/anti-black implicit biases—more readily discriminated against their black patients by giving them inferior treatment modalities, while more often giving the treatment of choice to their white patients.[39] The findings in this study were remarkable especially because the 287 physicians who participated also overwhelmingly declared they had no explicit preferences for white patients over black ones. The IAT study showed that even when doctors are not overtly prejudice, they might unconsciously discriminate nonetheless. However another study found differently.

In contrast to this first experiment, when 138 physicians were studied to determine whether their treatment of hypertension patients varied with changes in their levels of implicit racial bias, researchers found no association between physician bias and treatment decisions.[40] Moreover, this study showed no association between physician bias and patients' medical adherence or hypertension control outcomes. If the hypertension study is correct, then at least where hypertension is concerned, physicians' implicit racial and ethnic biases do not have any impact on their treatment decisions or on the differences in medical outcomes between black and white patients. Such a conclusion is counterintuitive but can possibly be explained. First, hypertension is a well-understood malady that patients generally know how to control. The study was conducted over a three-year period so that patient visits might have been infrequent and irregular, compromising the accuracy of results. The health facilities where the patients from this study were seen are large, integrated health systems where most patients generally have access to quality preventative care from primary care providers. Finally, the study does not account for patients who stopped going to the doctor, which is a group that evidence shows often includes minority patients who believe they have been the victims of

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discrimination. In summary, the nature of the disease, the healthcare setting, and patient behavior are important factors that may make this careful study an outlier.

Other researchers have found associations between pediatricians' implicit bias, and differences in their willingness to prescribe pain medication to black and white children with pain, but did not see any differences in these doctors' treatment of children with asthma, attention deficit hyperactivity disorder (ADHD), or urinary tract infections.[41] When medical students were studied, these doctors-in-training were found to share the same pro-white levels of implicit bias that others in the general population held. However, unlike older, experienced physicians, there was almost no association between these younger providers and treatment decisions they made.[42] Taken together, these studies of possible medical treatment discrimination due to implicit bias paints a mixed picture. While the evidence of physician discrimination appears strong when we look at the overwhelming evidence of patient health disparities, the link between biased treatment decisions and healthcare discrimination is not conclusive, that is, until researchers consider the *entire* scope of physician and patient encounters.

ii. Discrimination in Healthcare at the Clinical Level

Physicians and patients are affected by implicit racial and ethnic biases before, after, and during the clinical relationship, not only at the point of treatment decisions. Discrimination permeates every aspect of provider-patient interaction in order to yield the discriminatory results we call health disparities. The social psychology evidence to support this assertion describes six different pathways or "mechanisms" through which unconscious racism operates to cause discrimination in healthcare. Biased perceptions constitute the first mechanism connecting unintentional discrimination to disparities. Physicians hold implicit biased perceptions that cause discriminatory assumptions about patients' likely education and resources available for adherence even before they enter the hospital or examination room.[43] Perceptions made in advance may cause physicians to surmise that a black patient will be unfriendly or uncooperative, while a Hispanic patient will exaggerate their symptoms, and Native American, African American, and Hispanic American patients will lack the educational resources to deal with complicated treatment plans. These perceptions may work to the detriment of the treatment that minority patients receive. Social scientists have shown that biased perceptions also influence a second mechanism before doctors and patients meet. Statistical discrimination provides a second mechanism to link bias to disparate health outcomes.[44] In some cases, doctors may improperly generalize data they know to be true about some patients who are members of a racial minority, and conclude without evidence that the data is true about all patients of that racial group. Therefore, physicians may err by ascribing data about a patient's social group that does not fit that individual patient at all. For example, physicians have been shown to make incorrect generalizations about

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minority patients' educational attainment or resources available to adhere to complex treatment regimes.[45] Similarly, statistical discrimination occurs when a physician infers the likely cause of a patient's problem and the steps to address it based on assumptions about unobservable variables. In this instance a physician may choose to make a prediction about the medication a patient will best respond to, based on information about a patient's social group characteristics simply by analyzing unrelated racial and ethnic cues she can observe. Thus, a doctor may resort to stereotypes such as presumptions about patients' susceptibility to abusing narcotics or frequency of sexual activity that result in misdiagnosis or disparate treatment decisions. Another form of statistical discrimination arises when physicians allow the "noise" of certain probability data to distract their accurate evaluation of a patient's symptoms. For example, knowing that black patients have a lower probability of depression than whites may influence a physician to incorrectly truncate her search for the source of an African American patient's report of lethargy and missed work over the past two weeks. Thus implicit bias can operate throught the first two mechanisms—biased physician perceptions and statistical discrimination to affect health disparities even before a doctor and patient ever meet.

The third and fourth mechanisms through which unconscious racism can travel to produce discriminatory healthcare occur during the face-to-face communication exchange between patient and provider. Considerable scholarly attention is devoted to examining physician verbal and nonverbal communication with patients generally and minority patients in particular. The third mechanism involves physician communication. Studies have shown that physicians' posture, eye contact, tone of voice, questions, and information content, and the length of the clinical visit differs with minority as compared to white patients. Among black patients, one study showed that physicians' implicit racial bias was associated with physicians exercising more verbal dominance in patient conversations, longer visits, slower speech, less patient centeredness, and receiving poorer patient ratings of interpersonal care.[46] Studies even show that physicians, who are in no way prejudiced overtly, display heightened levels of anxiety and even hostility when interacting with minority patients.[47] Medical discrimination that adversely impacts minority health can result from these communication differences.

Moreover, it turns out that patients pick up these discriminatory cues from their physicians and respond in turn with discriminatory feedback of their own contributing to the fourth mechanism. A remarkable study by Dr. Louis Penner showed that black patients react most negatively to physicians who report low explicit racial or ethnic prejudice, but who also display high IAT scores, suggesting greater anti-black implicit bias.[48] Indeed, black patients tested showed more favorable responses to physicians with very high explicit biases than to the doctors who had contradictory implicit and explicit

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bias measures. Researchers have coined the term “aversive racist” for those who are explicitly race-neutral but implicitly race-biased, and there is evidence that interactions with such doctors adversely impacts minority patient health. Black patients who judge their physicians’ communication as less informative, supportive, and partnering ultimately have lower satisfaction ratings after the clinical encounter. These patients also show correspondingly lower adherence rates as well, resulting in the likelihood that their health outcomes will be worse than white patients experience.

To complete the interaction between the third mechanism—communication and conduct, on the physician side, and the fourth mechanism—communication and conduct on the patient side, Dr. Lisa Cooper has called the communication reciprocity between physician and patient, a “feedback loop.” When patients ask few questions, seem reluctant rather than forthcoming with medical information, or fail to participate in medical decision-making, physicians may also sense bias and discrimination toward them and respond by limiting the information or time they give to minority patients.[49] Researchers have yet to quantify the extent of discrimination that comes from bias-tainted communication, but the importance has been identified by social scientists and could not be overstated.[50] Some evidence suggests minority patients who are dissatisfied with their providers will simply stop seeking medical care, or change providers often. The result is that discrimination by both parties to the clinical encounter can diminish the quality and continuity of patient care. A provider’s negative perceptions may be reinforced through negative communication, discriminatory interpretation of patient data, and unwittingly biased interpretation of patient conduct. The cumulative and complex interaction of these unconscious biases is likely a more significant source of disparities in medical treatment than policy-makers have understood to date and may explain the contradictory data researchers have seen in studies that examine the next mechanism through which discrimination impacts minority patients.

Several studies have shown that physicians’ implicit racial and ethnic biases are associated with inferior medical treatment decisions for minority patients as compared to white patients, and thus disparate physician treatment decisions constitute the fifth mechanism.[51] However, as discussed earlier, a single study reached contradictory results finding that primary care physicians’ medical treatment decisions of hypertension patients were not associated with their implicit bias levels.[52] In addition to the possibility that this aberrational study does not account for patients who discontinue treatment when they perceive physician discrimination, the hypertension study may add the straightforward but limited conclusion that physician biases affect primary care physicians differently than other specialists, with respect to a single disease.

Racial discrimination due to implicit bias continues to operate even after patients leave the hospital, clinic, or physician’s office, through the sixth and final mechanism: patients’

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adherence decisions. Patients who do not trust their physicians do not accept their medical advice, seek medical care less frequently, and are less likely to adhere to treatment recommendations. Thus, these patients are also more likely to have inferior health outcomes when compared to patients whose communication allows them to build a trust relationship with their providers.[53] Taken together, the research supports the conclusion that unconscious racial and ethnic discrimination is a contributing cause to the inferior quality of health and healthcare that minority patients experience in America.[54]

The six mechanisms that describe how individual cognitive biases infiltrate healthcare delivery comprise a conceptual model of implicit bias in healthcare that has been called "The Biased Care Model."[55] The model elucidates the pathways through which individual biases travel to affect minority patient health outcomes. However, physician and patient level biases do not tell the entire story. These interpersonal interactions are replicated throughout the large and complex organizational structures that increasingly characterize the healthcare industry, to produce institutional discrimination at institutional and systemic levels.

iii. Discrimination at Organizational and Systemic Levels

Dr. Joseph Betancourt and others have identified organizational and structural sources that produce discrimination and inequities in American healthcare.[56] Institutionalized discrimination occurs in hospital systems, managed care networks, and accountable care organizations that adversely impact minority health broadly.[57] For example, the lack of diversity in the leadership of healthcare organizations makes it more likely that institutions are defined by majoritarian cultural norms. These norms may ignore minority patient needs for translators, signage, or a sufficiently diverse workforce to give minority patients interactions with minority providers who have been shown to produce higher patient satisfaction and improved outcomes for vulnerable patients. Also, organizational biases systemically fail to account for minority patients' unique cultural norms associated with important processes such as informed consent.[58] The lack of diversity in the healthcare delivery workforce has been associated with some poor minority patient outcomes.[59] Minority physicians have been shown more likely than white physicians to offer more effective care to minority patients and more likely to deliver care to minority populations. Yet, minorities are significantly underrepresented within the faculties, administration, student populations, and curricular content of American medical schools and schools of public health. Moreover, formal hierarchies and bureaucratic internal structures that characterize these academic institutions and healthcare deliverer overall tend to perpetuate discrimination through specialization, proliferation of titles, chains of command, and narrow spheres of control. Large institutional providers often segregate women and minorities in subordinate positions, such as nursing staffs, orderlies,

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janitorial staff, and support workers that lack discretion to significantly impact the quality of patient treatment decisions.

The need to construct solutions that address health inequality at the organizational and systemic levels has been described as “urgent.”[60] However the evidence is that providers have been slow to respond to this urgency, and the research that would support evidence-based changes in healthcare delivery is nascent. For example, few institutional studies have assessed changes in health disparities as a primary outcome. Some limited evidence suggests that clinical reorganization, multidisciplinary patient case management, peer support, collaborative socio-medical care models and, health education directed toward reducing disparities may have a positive impact on minority health outcomes, especially when accompanied by community outreach and partnership.[61] However, more research exploring the relationship between organizational discrimination and disparate health outcomes is needed. While discriminatory institutions outside of the healthcare industry such as residential segregation and political governance have been shown to significantly impact disparate outcomes,[62] researchers and policy-makers have paid inadequate attention to addressing the sources of health inequality that foment from within healthcare institutions and systems.

b. Toward Nondiscriminatory Healthcare

Recall that racial and ethnic discrimination by entities that receive federal dollars is against the law. In 2011 the federal government paid 27.6% of the $2.7 trillion spent on healthcare nationally, to reimburse hospitals, nursing homes, and physicians for discriminatory care. Recall also the extent to which African, Latino, Asian, and Native Americans are suffering from disease and death when compared to whites. By one analyst’s count, discrimination in healthcare is responsible for over 84,000 “excess” or avoidable minority deaths annually.[63] In spite of the fact that the American Medical Association first issued a report calling for the elimination of disparities in 1994, by most recorded measures the majority of health disparities in quality and access to care continue to persist or grow. Notwithstanding a nationwide effort to impose largely voluntary standards for nondiscriminatory healthcare.[64] Finally, recall the plain language and statements of legislators who enacted the national law prohibiting racial and ethnic discrimination by federal contractors. The urgency of reforming and enforcing antidiscrimination law in healthcare could not be clearer.

In 2003, the Institute of Medicine’s landmark report *Unequal Treatment* identified patient-, treatment-, and systems-level variables that may contribute to health disparities. Yet, in the decade that has followed, systemic interventions have been limited while the evidence that discrimination harms and even causes premature deaths in minority patient

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populations continues to grow. It may be reasonably argued that this disproportionate response provides a compelling basis to require legal accountability for discrimination that produces inequity in healthcare at clinical, institutional, and systemic levels. Currently, however, the antidiscrimination laws are inadequate to address the unconscious discrimination that characterizes clinical, institutional, and systemic discrimination in healthcare. The remainder of this chapter argues for a change in antidiscrimination law that is commensurate with the urgency, severity, and reality of unconscious discrimination in American healthcare.

c. Restoring American Antidiscrimination Law

Title VI of the Civil Rights Act remains the most direct prohibition against racial and ethnic discrimination in American law. Yet, as discussed earlier, this law is powerless to address the unintentional rather than intentional discrimination that has been shown to permeate American healthcare. This has not always been the case. Ironically, as the national expression of racial discrimination has evolved from explicit and overt bigotry, to more advanced and subtle forms of unconscious racism, the Supreme Court has retreated from the congressional aspiration and promise expressed when enacting Title VI, that the federal government would "no longer subsidize racial discrimination." By returning to its original intent for the federal antidiscrimination law, Congress could effectively and substantially reduce health and healthcare disparities. Unfortunately, to restore the statute to its original purpose, Congress must act to reform the language of Title VI in order to counteract the U.S. Supreme Court's tortured interpretation of the law.

In 1974 and again in 1983, the Supreme Court affirmed that the provisions of Title VI prohibited unintentional discrimination. "The Court squarely held in *Lau v. Nichols*, that Title VI forbids the use of federal funds not only in programs that intentionally discriminate on racial grounds but also in those endeavors that have a disparate impact on racial minorities."[65] In *Guardians Association v. Civil Service Commission of New York*, even though the Court in that case limited recovery for unintentional discrimination to declaratory and injunctive relief, Justice White opened the *Guardians Assn.* opinion by declaring, "[t]he threshold issue before the Court is whether the plaintiffs in this case need to prove discriminatory intent to establish a violation of Title VI.... I conclude, as do four other Justices in separate opinions, that the Court of Appeals erred in requiring proof of discriminatory intent."[66] Justice White concluded the *Guardians* opinion writing, "[i]n conclusion, for the reasons expressed above, I am convinced that discriminatory intent is not an element of a Title VI violation.... "[67]

Justice White also pointed to congressional inaction as evidence Congress intended to prohibit unintentional discrimination. Justice White explained, "I discern nothing in the

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legislative history of Title VI, … that is at odds with the administrative construction of the statutory terms [reaching disparate impact discrimination]. Congress, furthermore, has consistently administered the Title, in this manner for almost two decades without interference. It must be concluded that Title VI reaches unintentional, disparate-impact discrimination as well as deliberate racial discrimination."[68] Similarly citing congressional inaction, Justice Marshall pointed out in his dissent from the majority's holding that in 1966 a proposal to prohibit only intentional discrimination under Title VI never emerged from committee. In fact, Marshall said, "[s]ince the passage of the 1964 Act, Congress has also enacted 10 additional statutes modeled on §601 of Title VI, none of which define discrimination to require proof of intent."[69] In 1992, even Justice Clarence Thomas wrote separately in *United States v. Fordice* to explain that a Title VI claim does not require "proof of a present intent to discriminate" if an elementary school policy originated during a period of *de jure* segregation.[70] Yet, in 2001 the Supreme Court asserted with conviction, "it is similarly beyond dispute—and no party disagrees—that §601 prohibits only intentional discrimination."[71] This statement, apparently relying upon a view denounced by five Justices in *Guardians*, is simply not supported by the Court's prior opinions.

In a second reversal of Title VI jurisprudence, the *Sandoval* Court swept away the rights of private parties to bring disparate impact claims saying that Congress had created none "and the courts may not create one, no matter how desirable that might be as a policy matter, or how compatible with the statute."[72] Admittedly, Title VI does not contain an explicit provision empowering "private attorneys general" to enforce its prohibitions. However the Supreme Court in *Cannon v. University of Chicago* expressed its approbation of lower court rulings that found that Title VI implied a private cause of action.[73] Comparing Titles VI and IX the *Cannon* Court said, "[n]either statute expressly mentions a private remedy for the person excluded from participation in a federally funded program. The drafters of Title IX explicitly assumed that it would be interpreted and applied as Title VI had been during the preceding eight years."[74] That Congress had also approved implied private causes of action under Title VI[75] was of no moment to the *Sandoval* Court.

Justice Scalia went on to further erode Title VI protections in *Alexander v. Sandoval*, saying, "we must assume for purposes of deciding this case that regulations promulgated under §602 of Title VI may validly proscribe activities that have a disparate impact on racial groups even though such activities are permissible under §601."[76] Scalia's opinion in *Sandoval* stands in stark contrast to Justice Thurgood Marshall's statement of the rule of law that had controlled §602 of Title VI for more than thirty years. In *Alexander v. Choate*, Justice Marshall wrote for the majority to hold that a state's reduction in

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Medicaid covered services did not violate the Rehabilitation Act of 1973.[77] In 1985 Marshall explained, "the Court [has] held that actions having unjustifiable disparate impact on minorities could be redressed through agency regulations designed to implement the purpose of Title VI. In essence, then, we held that Title VI had delegated to the agencies in the first instance the complex determination of what sorts of disparate impacts upon minorities constituted sufficiently significant social problems, and were readily enough remediable to warrant altering the practices of federal grantees that had produced those impacts."[78] The *Sandoval* Court, in contrast, dismissed the decades of Title VI precedent it reversed by referring to "the understanding of private causes of action that held sway 40 years ago when Title VI was enacted" as "the *ancient regime*."[79]

A thorough review of the Court's departure from Congress's view of Title VI is important for at least two reasons. First, it would appear that during the half century that followed passage of the landmark Civil Rights Act of 1964, the U.S. Supreme Court has replaced Congress as the authority to protect the civil rights of minorities against discrimination using its plenary power of judicial review to enact a new and narrower civil rights agenda. The Supreme Court has not only contradicted Title VI's plain language that expressly forbids federally funded providers from discriminating or denying healthcare benefits to minorities, as well as the best evidence of Congress's intent to enact a law that "recognize[s] no prejudice,"[80] but the Court has also ignored the best empirical evidence concerning the unintentional nature of racial and ethnic discrimination in America. This points to the second reason to closely scrutinize the Supreme Court's Title VI jurisprudence. The Court's focus on intentionality[81] comes at a time when empirical evidence that even unintentional discrimination can be intentionally controlled has mounted. For the past twenty years, social scientists have published evidence that implicit biases are malleable. This is an important and underappreciated fact that bears repeating. Substantial scientific evidence shows that unconscious racism is not inevitable, though it operates automatically; is not inaccessible to deliberate human control, though it occurs unintentionally; and implicit biases are not inaccessible even though they form subconsciously. Individuals as well as institutions, it turns out, can substantially mitigate implicit racial biases.

The negative stereotypes previously viewed as inevitable, involuntary attitudes, in fact are merely patterns of thought activation that are simultaneously determined by the context and weight of new information and connected to existing and underlying beliefs. Scientists call this the "connectionist" model of implicit bias, and it long ago replaced the old theories of automaticity. Psychologists now conclude that "stereotypes are quite elastic and thus any individual could hold and even change an infinite number of representations of a social category's members when viewed across time and place."[82] Implicit biases are constructed over time, and therefore can be deconstructed over time

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as well. In plain language, implicit biases are like a bad driving habit: with practice, the habit can be changed.

Given "the now bountiful evidence that automatic attitudes—like self-reported attitudes—are sensitive to personal, social, and situational pressures,"[83] individuals as well as institutions may reasonably be held accountable for taking action, or failing to take action, to reduce the discrimination that results from unconscious racism. In healthcare, for example, the malleability evidence provides a rational way for providers to align the specific, remedial interventions that effectively disrupt implicit biases, with each of the six mechanisms in clinical healthcare relationships that act as pathways for discrimination to ultimately harm minority health outcomes. With this evidentiary basis, moreover, policy-makers have a compelling basis to incentivize a change in the social norms surrounding the presumed ubiquity and lack of culpability that has sheltered unconscious racism from censure. Finally, based on the malleability evidence, lawmakers can reconsider the assumption that those who are unconscious racists lack discriminatory purpose; antidiscrimination law may prohibit intentional disregard for the scientifically proved interventions that can reduce unintentional as well as intentional discrimination based on race, color, or national origin.

Congress could restore the civil rights law to its original purpose and take back the ground ceded to the current Supreme Court in setting a civil rights agenda for this nation by amending the plain language of Title VI. Amending the Civil Rights Act to expressly prohibit unintentional discrimination will account for the fact that, in the words of Justice Ginsburg, joined by Justice Breyer, "[i]t is well documented that conscious and unconscious race bias, even rank discrimination based on race, remain alive in our land, impeding realization of our highest values and ideals."[84] Next, an amendment restoring a private cause of action for disparate impact claims will empower minority patients and their advocates to use structural reform litigation to combat systemic unconscious discrimination that has gone unchecked in healthcare, as well as in other publicly funded sectors.

A further amendment creating an affirmative defense for government grantees who can show they have taken reasonable, evidence-based steps to reduce discrimination due to implicit bias will incentivize all federal contractors to engage in ex ante, self-analysis and undertake the interventions social scientists have proved effective to mitigate discrimination. This amendment would introduce a flexible negligence standard into the statute that would serve two purposes. In the first instance, a negligence standard would incentivize government grantees—say a hospital—to employ all reasonable methods that social scientists have demonstrated will reduce discrimination due to unconscious racism. For example, a hospital may replace ineffective programs such as cultural competency seminars, with the type of multiweek stereotype negation training for medical staff that

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measurably reduces implicit biases over the long term. Responding to evidence from the malleability literature reviewed in this chapter, the same hospital can aggressively signal a social consensus that implicit as well as explicit discrimination is no longer the accepted norm and can back up these signals with affirmative hiring, promotion, and retention plans that ensure patients and providers regularly interact with minority leaders who provide counterstereotypes throughout their organizations.

The second purpose the negligence standard would serve is to encourage the industry to develop creative, structural solutions to the problem of implicit bias that have hitherto been discussed as merely in the context of an individual burden. In light of healthcare consolidation due to the Affordable Care Act reforms, defeating unconscious discrimination in healthcare will have to be driven by institutions, which will operate as the cheapest cost avoider by virtue of the increased influence they will exercise over the healthcare workforce. Finally, the statute should allow for compensatory damages in cases of intentional discrimination, punitive damages against nongovernmental entities in cases of intentional discrimination, and equitable remedies, including attorneys' fees, in all other Title VI cases. In summary, Title VI should be amended to 1) expressly prohibit unintentional discrimination, 2) restore a private cause of action for disparate impact cases, 3) establish a negligence standard for disparate impact discrimination, and 4) clarify damages. Taken together, these four amendments will operate preventatively to prospectively influence health providers to reduce their discriminatory behavior.[85]

Indeed, the 111th Congress evinced its firm commitment to addressing discrimination in healthcare with the passage of the Affordable Care Act Section 1557.[86] This is a promising new civil rights statute, dedicated specifically to healthcare. The Affordable Care Act reaffirms and leaves Title VI and its regulations in place. However, the new statute significantly enlarges Title VI protections in at least four ways. First, Section 1557 prohibits discrimination based on age, disability, and sex in addition to prohibiting discrimination based on race, color, and national origin. Second, the Affordable Care Act's civil rights provision covers a larger range of participants in the healthcare industry than Title VI.[87] The new civil rights law includes health insurers, hospitals, and the newly created health insurance exchanges. The act gives the Office of Civil Rights authority to investigate complaints under Section 1557.[88] For example, the Office may use the breadth of this new antidiscrimination tool to address institutional bias and discrimination in the way insurers and health plans organize networks, selectively contract with providers, and make coverage decisions. Third, the Affordable Care Act Section 1557 grants individuals the right to file administrative complaints alleging violations of the nondiscrimination provision, and fourth, the new provision could plausibly be read to acknowledge a private right of action to protect civil rights,[89] though admittedly, the restoration of a private right of action is by no means clear. Section

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1557's incorporation of "the enforcement mechanisms provided for and available under "the civil rights provisions in Title VI, Title IX, §504, and the Age Discrimination Act,[90] could be read to prohibit both intentional disparate treatment and unintentional disparate impact discrimination. However, until the Department of Health and Human Services promulgates and enforces the regulations to establish the reach of this expanded civil rights law, federal antidiscrimination law will remain vulnerable to the uncertainty of case-by-case judicial construction of the law.

Members of Congress most recently evinced interest in broadening federal civil rights law during the 2012 legislative session. The 112th Congress considered a bill to strengthen Title VI that failed to pass the Senate Committee on Veteran's Affairs. The language of that proposed bill, however, provides guidance for a comprehensive Title VI overhaul that could once again make the law an effective weapon against inequality in health, healthcare, and beyond. Four amendments are needed to fully restore Title to effectively prohibit the use of federal funds to discriminate against or deny benefits to minority patients. First, Section 601 could be amended to expressly define disparate impact to include a prohibition against unintentional discrimination. Second, to operationalize this prohibition, Congress would add language approving an affirmative defense for those who have taken reasonable steps to reduce unconscious discrimination under Section 601 so that it would read as follows:

Section 601 of Title VI:

> **(a)** No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.
> **(b)** Discrimination based on disparate impact with respect to a program or activity is established under this section only if–
>
> > **(1)** a Federal department or agency, or any person aggrieved, demonstrates that an entity subject to this title has a policy or practice with respect to the program or activity that causes a disparate impact on the basis of race, color, or national origin; and
> > **(2)** the entity fails to demonstrate that it has taken reasonable steps to reduce discriminatory harms due to unconscious or unintentional biases; and
> > **(3)** the entity fails to demonstrate that the challenged policy or practice is related to, and necessary to achieve, the substantial and legitimate nondiscriminatory goals of the program or activity; or

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> **(4)** a Federal department or agency, or the person aggrieved, demonstrates that a less discriminatory alternative policy or practice exists, and the entity refuses to adopt such alternative policy or practice.
>
> **(2)** In this subsection, the term “demonstrates” means meets the burdens of production and persuasion.

Third, Congress should amend Section 602 language to restore a private right action to prosecute disparate impact claims, and affirm the authority of agencies and departments to enforce the statute. Fourth, the reformed statute would add the following language to the end of Section 602 to provide for appropriate remedies:

> **(b)** Any person aggrieved by the failure of an entity to comply with section 601 may bring a civil action in any Federal or State court of competent jurisdiction to enforce such person’s rights and may recover equitable relief, reasonable attorney’s fees (including expert fees), and costs. The aggrieved person may also recover legal relief (including compensatory and, from nongovernmental entities, punitive damages) in the case of noncompliance based on evidence of intentional discrimination. In an action brought by an aggrieved person based on evidence of disparate impact, the aggrieved person may recover equitable relief, reasonable attorney’s fees (including expert fees), and costs.
> **(c)** Nothing in subsection (b) limits the authority of a federal department or agency to enforce Section 601.

IV. Conclusion

These four proposed changes to Title VI would transform federal antidiscrimination provisions to reaffirm Congress’s original intent for the civil rights law and to meet the challenge of today’s new forms of racial and ethnic discrimination. Yet, these suggested amendments are not entirely free from the risk of overinclusiveness in light of the ubiquity of unconscious bias. Nor are they free from possible underinclusiveness, given the flexibility of the negligence standard proposed here. Nevertheless, a summary of the information set out in this chapter will help to underscore the severity of the harm and urgency of the need to reduce disparities that justify reform of federal antidiscrimination law. First, the evidence that modern-day racial discrimination is caused by implicit bias belies the notion that discrimination has disappeared from the American landscape just because overt bigotry is no longer the societal norm. Instead, the historical legacy of discrimination is alive and well, operating through unseen implicit biases, but

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nonetheless visiting severe harm upon the health and well-being of racial and ethnic minorities. Second, discrimination due to unconscious bias is not only alive and well but also operates throughout the context of healthcare delivery to quite literally prevent patients who belong to ethnic and racial minority groups from living well or as long as their white counterparts. Unconscious racism in healthcare precludes minority patients from equal access to healthcare and from an equal opportunity to live healthy lives that whites enjoy. And third, studies show that individuals and institutions can *intentionally* reduce unintentional discrimination that arises from implicit biases. Therefore, the malleability evidence that unconscious racial discrimination may be consciously mitigated provides a sound evidentiary and moral basis to reimagine when and how the law may justly prohibit unconscious discrimination against minorities by the healthcare industry.

Thus, a reconceptualization of Title VI, the cornerstone of federal landmark civil rights law, will reach far beyond merely rectifying inequities in healthcare. Indeed, returning Title VI to its original stature as a potent prohibition against state-funded racial and ethnic discrimination could save and improve the quality of life for tens of thousands of minority patients in America each year.

Notes:

([1]) 42 U.S.C. § 2000d (2012).

([2]) David B. Smith, *The Racial Segregation of Hospital Care Revisited: Medicare Discharge Patterns and their Implications*, 88 AM. J. PUB. HEALTH 461 (1988).

([3]) BRIAN D. SMEDLEY ET AL., *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* (Brian D. Smedley et al. eds., 2003).

([4]) *See,* e.g., *Patients' Voices in Early 19th Century Virginia: Letters to Doct. James Carmichael & Son*, UNIV. OF VA. (2005), http://carmichael.lib.virginia.edu/story/slavecare.html.

([5]) William H. Williams, *The Early Days of Anglo-America's First Hospital: The Pennsylvania Hospital, 1751–1775*, 220 JAMA 115 (1972).

([6]) David S. Jones, *The Persistence of American Indian Health Disparities*, 96 AM. J. PUB. HEALTH 2122 (2006).

([7]) Jew Ho v. Williamson, 103 F. 10 (1900).

([8]) *But see In re* Lee Sing, 43 F. 359 (C.C.N.D. Cal. 1890), where a California court declared one such municipal ordinance unconstitutional.

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([9]) Natalia Molina, *Borders, Laborers, and Racialized Medicalization*, 101 AM. J. PUB. HEALTH 1024 (2011).

([10]) *Id*. at 1026.

([11]) David B. Smith, *The Racial Segregation of Hospital Care Revisited: Medicare Discharge Patterns and Their Implications*, 88 AM. J. PUB. HEALTH 461(1988).

([12]) *See id*.

([13]) Alan S. Go et al., *Heart Disease and Stroke Statistics—2013 Update: A Report from the American Heart Association*, 127 CIRCULATION e6 (2013).

([14]) Clyde W. Yancy et al., *Coalition to Reduce Racial and Ethnic Disparities in Cardiovascular Disease Outcomes: Why CREDO Matters to Cardiologists*, ELSVIER INC. (2011).

([15]) Rebecca Siegel, Deepa Naishadham, & Ahmedin Jemal, *Cancer Statistics, 2013*, 63 CA: CANCER J. CLINICIANS 11 (2013).

([16]) *Id*.

([17]) GENEVIEVE M. KENNEY ET AL., URB. INST., RACIAL AND ETHNIC DIFFERENCES IN ACCESS TO CARE AND SERVICE USE FOR CHILDREN WITH COVERAGE THROUGH MEDICAID AND THE CHILDREN'S HEALTH INSURANCE PROGRAM 12 (2013), *available at* http://www.urban.org/UploadedPDF/412781-Racial-and-Ethnic-Differences-in-Access-to-Care-and-Service-Use-for-Children.pdf.

([18]) I use the terms "black" and "African American" interchangeably to denote people descendent from Africa. *See,* e.g., Lee Sigelman & Steven A. Tuch, *What's in a Name? Preference for "Black" Versus "African-American Among Americans of Descent*, 69 PUB. OPINION Q. 429 (2005).

([19]) Thomas G. McGuire & Jeanne Miranda, *Racial and Ethnic Disparities in Mental Health Care: Evidence and Policy Implications*, 27 HEALTH AFF. 393 (2008).

([20]) Michelle van Ryn, CTR. CHRONIC DISEASE OUTCOMES RES., RESEARCH ON THE PROVIDER CONTRIBUTION TO RACE/ETHNICITY DISPARITIES IN MEDICAL CARE (2005).

([21]) PRESIDENT'S TASK FORCE ON ENVTL. HEALTH RISKS & SAFETY RISKS TO CHILDREN, U.S. ENVTL. PROTECTION AGENCY, COORDINATED FEDERAL ACTION PLAN TO REDUCE RACIAL AND ETHNIC ASTHMA DISPARITIES (2012).

([22]) Sarah Stark Casagrande et al., *Perceived Discrimination and Adherence to Medical Care in a Racially Integrated Community*, 22 J. GEN. INTERNAL MED. 389 (2007).

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([23]) Gilbert C. Gee et al., *Self-Reported Discrimination and Mental Health Status Among African Descendants, Mexican Americans, and Other Latinos in the New Hampshire REACH 2010 Initiative: The Added Dimension of Immigration*, 96 AM. J. PUB. HEALTH 1821 (2006).

([24]) Cheryl L. Giscombe & Marci Lobel, *Explaining Disproportionately High Rates of Adverse Birth Outcomes Among African Americans: The Impact of Stress, Racism, and Related Factors in Pregnancy*, 131 PSYCHOL. BULL. 662 (2005).

([25]) David R. Williams & Selina A. Mohammed, *Discrimination and Racial Disparities in Health: Evidence and Needed Research*, 32 J. BEHAV. MED. 20 (2009).

([26]) *Id.*

([27]) THOMAS A. LAVEIST, DARRELL J. GASKIN, & PATRICK RICHARD, JOINT CTR. POL. & ECON. STUD., THE ECONOMIC BURDEN OF HEALTH INEQUALITIES IN THE UNITED STATES (2009).

([28]) Thomas A. LaVeist, *Disentangling Race and Socioeconomic Status: A Key to Understanding Health Inequalities*, 82 J. URB. HEALTH: BULL. N.Y. ACAD. MED. iii26 (2005).

([29]) Melissa M. Farmer & Kenneth F. Ferraro, *Are Racial Disparities in Health Conditional on Socioeconomic Status?* 60 SOC. SCI. & MED. 191 (2005).

([30]) 42 U.S.C. § 2000d (2012).

([31]) Alexander v. Sandoval, 532 U.S. 275 (2001).

([32]) Simkins v. Moses H. Cone Memorial Hosp., 323 F.2d 959, 969 (4th Cir. 1963), *cert. denied*, 376 U.S. 938 (1964).

([33]) *Id.*

([34]) Of course, even once Congress enacted Title VI, federal law continued to sanction separate but unequal health care under the Hill-Burton Act, which controlled outside the reach of the Fourth Circuit's decision in *Simkins*.

([35]) Guardians Ass'n v. Civil Serv. Comm'n of New York, 463 U.S. 582, 599 (1983) (citing 110 Cong. Rec. 6546 (1964) (statement of Sen. Ribicoff)).

([36]) *See* Lau v. Nichols, 414 U.S. 563 (1974); *Guardians Ass'n*, 463 U.S. 582 ("The Court squarely held in *Lau v. Nichols*, that Title VI forbids the use of federal funds not only in programs that intentionally discriminate on racial grounds but also in those endeavors

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that have a disparate impact on racial minorities."); Alexander v. Choate, 469 U.S. 287 (1985). *But see* Regents of the Univ. of Cal. v. Bakke, 438 U.S. 265 (1976).

([37]) Anthony G. Greenwald & Linda Hamilton Krieger, *Implicit Bias: Scientific Foundations*, 94 CAL. L. REV. 945 (2006).

([38]) Kevin A. Schulman, *The Effect of Race and Sex on Physicians' Recommendations for Cardiac Catheterization*, 340 NEW ENG. J. MED. 618 (1999).

([39]) Alexander R. Green, *Implicit Bias Among Physicians and its Prediction of Thrombolysis Decisions for Black and White Patients*, 22 J. INTERNAL MED. 1231 (2007).

([40]) Irene V. Blair et al., *An Investigation of Associations Between Clinicians' Ethnic or Racial Bias and Hypertension Treatment, Medication Adherence and Blood Pressure Control*, 2014 J. GEN. INTERNAL MED. 987.

([41]) Janice A. Sabin & Anthony G. Greenwald, *The Influence of Implicit Bias on Treatment Recommendations for 4 Common Pediatric Conditions: Pain, Urinary Tract Infection, Attention Deficit Hyperactivity Disorder, and Asthma*, 102 AM. J. PUB. HEALTH 988 (2012).

([42]) Adil H. Haider et al., *Association of Unconscious Race and Social Class Bias with Vignette-Based Clinical Assessments by Medical Students*, 306 JAMA 942 (2011).

([43]) Michelle van Ryn & Jane Burke, *The Effect of Patient Race and Socio-Economic Status on Physicians' Perceptions of Patients*, 50 SOC. SCI. & MED. 813 (2000).

([44]) Ana I. Balsa & Thomas G. McGuire, *Statistical Discrimination in Health Care*, 20 J. HEALTH ECON. 881 (2001).

([45]) *Id*.; van Ryn & Burke, *The Effect of Patient Race and Socio-Economic Status on Physicians' Perceptions of Patients*.

([46]) Lisa A. Cooper et al., *Associations of Clinicians' Implicit Attitudes About Race with Medical Visit Communication and Patient Ratings of Interpersonal Care*, 102 AM. J. PUB. HEALTH 979 (2012).

([47]) Richard L. Street Jr., Howard Gordon, & Paul Haidet, *Physicians' Communication and Perceptions of Patients: Is It How They Look, How They Talk, or Is It Just the Doctor?* 65 SOC, SCI. & MED. 586 (2007).

([48]) Louis A. Penner et al., *Aversive Racism and Medical Interactions with Black Patients: A Field Study*, 46 J. EXPERIMENTAL SOC. PSYCHOL. 436 (2010).

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([49]) Howard S. Gordon et al., *Racial Differences in Doctors' Information-Giving and Patients' Participation*, 107 CANCER 1313 (2006).

([50]) Lisa A. Cooper, *Delving Below the Surface: Understanding How Race and Ethnicity Influence Relationships in Health Care*, 21 J. GEN. INTERNAL MED. 521 (2006).

([51]) *See,* e.g., Alexander R. Green et al., *Implicit Bias Among Physicians and Its Prediction of Thrombolysis Decisions for Black and White Patients*, 22 J. INTERNAL MED. 1231, 1231–38 (2007); Sabin & Greenwald, *The Influence of Implicit Bias on Treatment Recommendations*.

([52]) Blair et al., *An Investigation of Associations*.

([53]) Louis A. Penner et al., *The Experience of Discrimination and Black–White Health Disparities in Medical Care*, 35 J. BLACK PSYCHOL. 180 (2009).

([54]) Dara H. Sorkin et al., *Racial/Ethnic Discrimination in Health Care: Impact on Perceived Quality of Care*, 25 J. GEN. INTERNAL MED. 390 (2010).

([55]) *See* Dayna Bowen Matthew, *Just Medicine: A Cure for Inequality in Healthcare and Beyond* (forthcoming New York Univ. Press 2015) (on file with author).

([56]) *See,* e.g., Joseph R. Betancourt et al., *Defining Cultural Competence: A Practical Framework for Addressing Racial/Ethnic Disparities in Health and Health Care*, 118 PUB. HEALTH REPS. 293 (2003) (describing how "organizational, structural, and clinical cultural competence interventions" can improve health disparities).

([57]) Michele J. Gelfand et al., *Discrimination in Organizations: An Organizational-Level Systems Perspective*, CORNELL UNIV. ILR SCHOOL, Mar. 1, 2007, *available at http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1471&context=cahrswp*.

([58]) Dayna Bowen Matthew, *Race, Religion, and Informed Consent: Lessons from Social Science*, 36 J.L., MED. & ETHICS 150 (2008).

([59]) *See,* e.g., A. L. Stanton, *Determinants of Adherence to Medical Regimens by Hypertensive Patients*, 10 J. BEHAV. MED. 377 (1987).

([60]) Marshall H. Chin et al., *Interventions to Reduce Racial and Ethnic Disparities in Health Care*, 64 MED. CARE RES. & REV. 7S (2007) (literature review of interventions using cultural leverage, pay-for-performance, and public reporting of performance measures to reduce disparities).

([61]) *Id.*

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([62]) *See,* e.g., Gilbert C. Gee, *A Multilevel Analysis of the Relationship Between Institutional and Individual Racial Discrimination and Health Status*, 92 AM. J. PUB. HEALTH 615 (2002).

([63]) David Satcher, George E. Fryer, & Jessica McCann, *What If We Were Equal? A Comparison of the Black–White Mortality Gap in 1960 and 2000*, 24 HEALTH AFF. 459 (2005).

([64]) National Standards for Culturally and Linguistically Appropriate Services in Health Care (CLAS Standards) have governed health providers since 2001 and are largely ineffective. *See* Lisa C. Diamond et al., *Do Hospitals Measure Up to the National Culturally and Linguistically Appropriate Services Standards?* 48 MED. CARE 1080 (2010).

([65]) Guardians Ass'n v. Civil Serv. Comm'n of New York, 463 U.S. 582, 589 (1983).

([66]) *Id*. at 584.

([67]) *Id*. at 607.

([68]) *Id*. at 593.

([69]) *Id*. at 620.

([70]) United States v. Fordice, 505 U.S. 717, 746 (1992).

([71]) Alexander v. Sandoval, 532 U.S. 275, 280 (2001).

([72]) *Id*. at 286–87.

([73]) Cannon v. Univ. of Chi., 441 U.S. 677, 696 (1979).

([74]) *Id*. at 696.

([75]) *See* 42 U.S.C. § 2000d-7.

([76]) *Sandoval*, 532 U.S. at 281.

([77]) Alexander v. Choate, 469 U.S. 287 (1985).

([78]) *Id*. at 293.

([79]) *Id*. at 287.

([80]) 110 CONG. REC. 7045, 7064 (1964) (statement of Sen. John O. Pastore) (arguing for passage of Title VI).

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([81]) Washington v. Davis, 426 U.S. 229 (1976).

([82]) Alison P. Lenton, Martin Bruder, & Constantine Sedikides, *A Meta-Analysis on the Malleability of Automatic Gender Stereotypes*, 33 PSYCHOL. WOMEN Q. 183 (2008).

([83]) Irene V. Blair, *The Malleability of Automatic Stereotypes and Prejudice*, 6 PERSONALITY & SOC. PSYCHOL. REV. 242 (2002).

([84]) Grutter v. Bollinger, 539 U.S. 306, 345 (2003) (Ginsburg, J., concurring). [Typically only the author of the concurrence would be included.]

([85]) Jerry Kang, *The Missing Quadrants of Antidiscrimination: Going Beyond the "Prejudice Polygraph,"* 68 J. SOC. ISSUES 314 (2012).

([86]) Section 1557 of the Affordable Care Act provides:

> [A]n individual shall not on the ground prohibited under title VI of the Civil Rights Act of 1964, … title IX of the Education Amendments of 1972(20 U.S.C. 1681 et seq.), the Age Discrimination Act of 1975 (42 U.S.C. 6101 et seq.), or section 50 of the Rehabilitation Act of 1973 (29 U.S.C. 794), be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any health program or activity, any part of which is receiving Federal financial assistance, including credits, subsidies, or contracts of insurance, or under any program or activity that is administered by an Executive Agency or any entity established under this title.…

([87]) *See generally*, 42 U.S.C. §18116.

([88]) 42 U.S.C. §18116(c).

([89]) Sidney D. Watson, *Section 1557 of the Affordable Care Act: Civil Rights, Health Reform, Race, and Equity*, 55 HOW. L.J. 855 (2012).

([90]) 42 U.S.C. §18116(b).

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Civil Rights Laws as Tools to Advance Health in the Twenty-First Century

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Annu. Rev. Public Health 2016. 37:185–204

First published online as a Review in Advance on January 18, 2016

The *Annual Review of Public Health* is online at publhealth.annualreviews.org

This article's doi: 10.1146/annurev-publhealth-032315-021926

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Keywords

health reform, policy, social justice, multisectorial, disparities, equity

Abstract

To improve health in the twenty-first century, to promote both access to and quality of health care services and delivery, and to address significant health disparities, legal and policy approaches, specifically those focused on civil rights, could be used more intentionally and strategically. This review describes how civil rights laws, and their implementation and enforcement, help to encourage health in the United States, and it provides examples for peers around the world. The review uses a broad lens to define health for both classes of individuals and their communities—places where people live, learn, work, and play. Suggestions are offered for improving health and equity broadly, especially within societal groups and marginalized populations. These recommendations include multisectorial approaches that focus on the social determinants of health.

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INTRODUCTION

Martin Luther King, Jr., said, "Of all the forms of inequality, injustice in health is the most shocking and inhuman" (59, 73). This article focuses on civil rights laws and how their use can improve health. The focus is primarily on the United States, but lessons should be universal for those working to improve health outcomes and eliminate health disparities. To improve health in the twenty-first century, to promote access to and quality of health care services and delivery, and to address significant health disparities, all relevant tools and resources must be leveraged. Although core activities to promote and protect public health include identifying hazards for and problems with the health of individuals and communities as well as ensuring strong policies to address them (50), law, and specifically civil rights law, is one resource that has not been used effectively (42).

The US Declaration of Independence (written in 1776) states, "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness." Since the founding of the United States, there have been challenges by various groups, in their communities and in the courts, to ensure that these basic legal principles apply to all people and to protect individuals from discrimination based on race, gender, age, nationality, and disability, as well as the more recent additions of mental health status, sexual orientation, and gender identity. Unfortunately, significant health disparities persist and marginalized populations often cannot escape these inequities (2).

This review describes how civil rights laws and approaches help encourage health in the United States. It focuses on (*a*) how antidiscrimination laws address health disparities; (*b*) the role of the health, health care, and other sectors' laws in addressing inequities; and (*c*) the need for continued monitoring, research about, and enforcement of these laws. We use a broad lens to define health for both classes of individuals and their communities—places where people live, learn, work, and play—and focus on the impact of the social determinants of health. As background, we provide a summary of important laws that protect and promote civil rights (**Table 1**). Recommendations for using law and policy to address disparities and improve health should be relevant outside the United States, as well.

BACKGROUND

To explore the role of civil rights laws, it is important to define what is meant by the terms "health" and "civil rights" in this context. Health should be explained expansively and inclusively to address the various sectors, conditions, and environments that affect people. The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (105, p. 100). Although the use of the word "complete" regarding well-being has been questioned owing to the realities of life, chronic conditions, and the ever-sharper imaging and detection methods that make complete an unattainable ideal (48), this definition provides a starting point for discussion.

The term civil rights has been defined as "the rights that every person should have regardless of his or her sex, race or religion; the nonpolitical rights of a citizen; *especially*: the rights of personal liberty guaranteed to United States citizens by the thirteenth and fourteenth amendments to the Constitution and by acts of Congress" (71). These amendments (US Const. amend. XIII, amend. XIV), which abolished slavery after the Civil War and provided due process and "equal protection" of the law, respectively, are important cornerstones of civil rights in the United States. They have been instrumental in extending similar privileges and protections to other groups: women seeking suffrage (late 1800s to the early 1900s); farmworkers (1960s); and more recently, people with disabilities and those seeking expanded protections because of their sexual orientation, gender

Table 1 Significant laws that impact civil rights

Law	Year (ratified)	Purpose
US laws		
US Constitution		
Thirteenth amendment	1865	Abolished slavery
Fourteenth amendment	1868	Provides due process and equal protection for all
Fifteenth amendment	1870	Prohibits discrimination regarding voting based on "race, color, or previous condition of servitude"
Nineteenth amendment	1920	Granted women the right to vote
Civil Rights Act of 1964 [Pub. L. 88–352, 78 Stat. 241 (1964)]	1964	
Title I		Prohibits unequal application of voter registration requirements
Title II		Bans discrimination based on "race, color, religion, or national origin" in public establishments with a connection to interstate commerce or supported by the state
Title VI		Prevents discrimination based on race, color, or national origin by government agencies that receive federal funds
Social Security Act amendments (Medicare and Medicaid bills) [Pub. L. 89–97, 79 Stat. 286 (1965)]	1965	Created federal Medicare and Medicaid programs
Section 504 of the Rehabilitation Act of 1973 [Pub. L. 93–112, 87 Stat. 394 (1973)]	1973	States that no one with disabilities should be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal funding
Americans with Disabilities Act [Pub. L. 101–336, 104 Stat. 327 (1990)]	1990	Prohibits discrimination based on disability, which includes reasonable accommodations for employees with disabilities and accessibility requirements on public accommodations
Patient Protection and Affordable Care Act (ACA) [Pub. L. 111–148, 124 Stat. 119 (2010)]	2010	US health care reform bill
Section 1557 of the Patient Protection and Affordable Care Act (ACA) (42 U.S.C. §18116)	2015	Nondiscrimination provisions ban discrimination due to race, color, national origin, sex, age, or disability for health program or activities receiving federal financial assistance. Prohibits sex discrimination in health care and applies civil rights protections to health insurance marketplaces (proposed rules—Sept. 2015)
Supreme Court decisions		
Brown v. Board of Educ. [347 U.S. 483, 493 (1954)]	1954	Desegregated the US public school system
Olmstead v. L.C. [527 U.S. 581 (1999)]	1999	Publicly funded entities must serve individuals with disabilities in the least restrictive, most integrated setting possible
Obergefell v. Hodges [135 S. Ct. 2584 (2015)]	2015	Held that same-sex couples have a right to marry
International law/treaties		
Universal Declaration of Human Rights	1948	Assures the right to a standard of living adequate for health and well-being, including food, clothing, housing and medical care, social services, and the right to security
International Covenant on Economic, Social and Cultural Rights (ICESCR) (1966)	1966	Article 12 recognizes the "right of everyone to the enjoyment of the highest attainable standard of physical and mental health"
General Comment 14	2000	Explains the right to health in the ICESCR, includes socioeconomic factors that promote conditions in which people can lead a healthy live, and extends to the underlying determinants of health and gives minimum standards

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HEALTH AS A HUMAN RIGHT AND INTERNATIONAL LAW

Although an overarching right to health is not granted by the US federal government, this right is more explicit internationally. In 1948, the WHO Universal Declaration of Human Rights espoused that "everyone has a right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing and medical care and necessary social services" (100, Art. 25). This document sets out standards to which many aspire, and the recognition of the value of social and economic factors was prescient (5). Later, international treaties and documents such as the International Covenant on Economic, Social and Cultural Rights (ICESCR), the Convention on the Rights of Persons with Disabilities, the Convention on the Rights of the Child (1990), and the Declaration of Alma-Ata related to primary health care all recognized the need to protect health and included disabilities (68). Future legal clarification extended the right to health to include the socioeconomic factors that impact health and the determinants of health (99). This rights-based approach argues that promoting health and the broader social determinants of health are the responsibilities of governments and, specifically, of public health agencies (68). The US government has not recognized a universal right to health nor ratified any of these treaties (81).

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identity, or immigrant status (66). Perhaps the most well-known piece of legislation that continued to expand civil rights is Title VI of the Civil Rights Act of 1964 (Pub. L. 88–352), which prohibits discrimination based on race, color, or national origin. As the US Surgeon General Vivek Murthy has said, "To put it simply: health equity is a civil rights issue" (75).

Why Should We Discuss Public Health and Civil Rights in the Twenty-First Century?

There is much to be gleaned from the triumphs and tragedies of the modern civil rights era. Throughout US history, groups have used methods including protests and insurrection, resistance movements, economic boycotts, court challenges, and legislation to end discrimination and obtain the rights afforded to all by the US Constitution (66). These struggles include those of African Americans for freedom from slavery and, since then, for inclusion in society, against discrimination, and against overpolicing; Native Americans for land and sovereignty; and other racial and ethnic groups against unfair treatment by public authorities and private institutions (66). Liberation movements have asserted the rights of women, people with disabilities, immigrants, and those facing discrimination on the basis of sexual orientation or gender identity (35).

Even after many civil rights successes, health disparities and discrimination are still pervasive in the United States. Racism is a major issue that must be addressed, especially the existing harmful stereotypes and inequitable opportunities that impact some individuals (110). Camara Jones (physician, epidemiologist, and an expert on the impacts of racism on health and well-being) discusses institutionalized racism as "differential access to the goods, services, and opportunities of society by race" (52, p. 1212). This type of racism, often referred to as structural racism, is engrained or codified into laws and practices and can be found both in the everyday conditions and structures of life as well as in agency and access to power (52). The civil rights of people of color and other marginalized groups need to be protected to ensure their basic personal, political, and economic rights. If those rights are intact, individuals and their communities should become stronger and healthier. Laws and policies, and their effective and equitable implementation and enforcement, are important components in addressing these rights.

Even though the United States has no federally granted legal rights to health or health care, health is greatly valued. In 2013, US health spending made up 17.4% of the national gross domestic product (GDP), the most of any industrialized country (44), compared with an average of 10%

of GDP for WHO members (107). Government programs provide health coverage to many of the most vulnerable groups, and some states have also explicitly recognized a right to health in their own constitutions (64). The nation leads in spending and technological innovations but ranks poorly among industrialized nations in many of its health outcomes, such as infant mortality rates and life expectancy ranking (29, 79). As mentioned above, disparities in health and access to comprehensive health care contribute to these disappointing rankings (109).

Both the Institute of Medicine and the WHO concluded that to eliminate health disparities, especially in marginalized communities, improvements in access to and quality of health care and services are not enough (63, 90). Addressing the social determinants of health is crucial. Social determinants of health have been described by WHO as

> the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems. (108)

National and global health goals stress the need to focus on health equity and improvement in the social determinants of health to reduce inequities. The US Healthy People Initiative, managed by the Department of Health and Human Services (HHS), sets out consensus goals and objectives for each decade (currently 2010–2020), including an overarching goal "to achieve health equity, eliminate disparities, and improve the health of all groups" (102). To accomplish this objective, equal protection and application of laws and policies for all must be in place, supported through funding, and enforced zealously. Recent US health reform legislation, the Patient Protection and Affordable Care Act (ACA) [Pub. L. 111–148 (2010)], and accompanying administrative regulations and policies, are expanding access to health coverage across the population, including black and Latino/Hispanic adults (57, 67).

Using Civil Rights Laws to Address Health Disparities and Equity

The Centers for Disease Control and Prevention (CDC) state that the purpose of health equity is that all can reach their "full health potential" and that no one is hampered by social position or circumstance (8). Many in the United States face inequity, as seen in the health and health care sectors and other sectors that influence health, including housing and employment, access to goods and services, education, and transportation. Environments can also shape health: Where you live can impact your health more than genetics can (97), and the consequences can be deadly. Neighborhoods remain segregated by race and income. People of color in the United States are sicker and live shorter lives than whites do. For example, life expectancy for African American men and women is typically 5 years and 3 years, respectively, shorter than that of their white counterparts (15). Even larger gaps are not uncommon; a 10-year gap in life expectancy exists in Alameda County, California (53), and the difference in New Orleans, Louisiana, is reported to be 25 years (54).

Laws that are enforced and appropriately financed can help to eliminate discrimination and serve as levers for social change to improve health (**Table 1**). One example was the rapid desegregation of health care facilities in the United States in 1965–1966 during the implementation of the Social Security Amendments (Medicare and Medicaid), as Title VI of the Civil Rights Act prevented any institution receiving federal funding from discriminating against or segregating individuals (93). Desegregation led to increased access to health care services for many people of color. Remarkably, many of the discussions in communities today echo issues from the civil rights agenda 50 years ago—gaining access to fundamental elements of democracy such as voting rights and a fair justice system. There have been groundbreaking decisions, such as the recent Supreme

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Court decision upholding the right for same-sex marriages to be legally recognized [*Obergefell v. Hodges*, 135 S. Ct. 2584 (2015)]. This decision allows same-sex couples greater access to health insurance and a recent study found that those in legally recognized couples reported a tendency toward better health (56), attributed in part to improved mental health and well-being resulting from this recognition (62). Even so, events such as protests of police violence in Missouri, the shooting of nine African American worshipers by a white gunman in Charleston, South Carolina, and debates over immigration and refugees show that, despite legal successes, the past is not a faint echo (82).

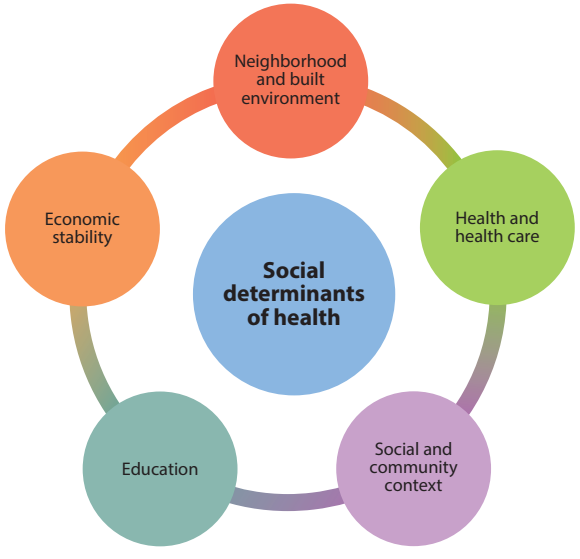
Civil Rights Approaches and the Social Determinants of Health

Addressing health disparities requires a comprehensive look at society and the impacts of policies and programs on the overall health of the population. The social determinants of health offer a framework for the variety of sectors and influences on health. In addition to the health and health care sectors, places and settings where people live, work, learn, and play have a significant impact on individuals' health (24). The following sections explain how civil rights laws can have an impact on five main determinant areas: (*a*) health and health care; (*b*) economic stability; (*c*) education; (*d*) neighborhoods and the built environment; and (*e*) social and community contexts (**Figure 1**).

HEALTH AND HEALTH CARE

Civil Rights Protections in the Health Care Sector

Several existing civil rights help to improve health and health access for historically marginalized populations. Provisions such as Title VI of the Civil Rights Act of 1964 (42 U.S.C. §2000d),



Each of these five determinant areas reflects a number of critical components/key issues that make up the underlying factors in the arena of social determinants of health.

Economic stability
- Poverty
- Employment
- Food security
- Housing stability

Education
- High school graduation
- Enrollment in higher education
- Language and literacy
- Early childhood education and development

Social and community context
- Social cohesion
- Civic participation
- Perceptions of discrimination and equity
- Incarceration/institutionalization

Health and health care
- Access to health care
- Access to primary care
- Health literacy

Neighborhood and built environment
- Access to healthy foods
- Quality of housing
- Crime and violence
- Environmental conditions

Figure 1

Social determinants of health graph and chart. Adapted from Reference 103.

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disability laws {Americans with Disabilities Act (ADA) [Pub. L. 101–336 (1990)], and Section 504 of the Rehabilitation Act [29 U.S.C. §794 (1973)]}, and the recently enacted Section 1557 of the ACA ensure that federal money does not support health care providers who discriminate on the basis of race, color, national origin, disability, age, sex, or gender identity (42 U.S.C. §18116).

Case Studies: Reducing Language Barriers and Protecting Those with Disabilities

Both the HHS and the US Supreme Court have construed "national origin" to include language, and thus recipients of federal funds cannot discriminate against those who are limited English proficient (LEP) [*Lau v. Nichols*, 414 U.S. 563 (1974)]. Because virtually all health care providers receive some federal funding, through Medicare, Medicaid, the Children's Health Insurance Program (CHIP), or other HHS funding, they must make certain that language barriers do not impact the quality of care provided to their LEP patients. Accurate communication is essential for clinicians to obtain a patient's history, make a correct diagnosis, and reduce medical errors; it is also important for patients to understand the clinician, comply with treatment regimens, and give informed consent.

Changing demographics in the United States over the past decades have resulted in a significant number of non-English languages being spoken at home. Approximately 21% of the US population speaks a language other than English at home (this includes US-born citizens, naturalized citizens, and immigrants), and approximately 9% are LEP.[1] Recognizing these changing demographics and the need to reinvigorate Title VI, President Clinton issued Executive Order (EO) 13166 entitled Improving Access to Services for Persons with Limited English Proficiency [65 Fed. Reg. 50121 (Aug. 16, 2000); 67 Fed. Reg. 41455 (June 18, 2002)]. The EO—affirmed by President G.W. Bush—requires federal agencies to issue guidance on making programs accessible to individuals with LEP. The HHS's Office for Civil Rights' (OCR) "LEP Guidance" evaluates compliance on a case-by-case basis, examining the totality of the circumstances. [68 Fed. Reg. 47311 (August 8, 2003)]. These laws mean that federally funded health care providers should ensure that qualified, no-cost interpreters and translations of important health care documents are available to patients [65 Fed. Reg. 80865 (Dec. 22, 2000)].

To protect those with disabilities, Section 504 of the Rehabilitation Act also prohibits discrimination by those receiving federal funds [29 U.S.C. §794 (1973)]. The ADA [Pub. L. 101–336 (1990)] prohibits discrimination in programs and activities of state and local governments and requires accommodations in public spaces. A landmark Supreme Court case, *Olmstead v. L.C.* [527 U.S. 581 (1999)], recognized that the ADA requires publicly funded entities to serve individuals with disabilities in the least-restrictive, most integrated setting possible given the resources in the state. Without question, *Olmstead* has had a revolutionary impact. Both individuals with disabilities and the federal government can file cases addressing violations of this integration mandate; resulting settlements have produced significant reforms in 11 states (10). The ADA and the recently enacted Mental Health Parity Act [Pub. L. 110–343 (2008)] allow people with mental illness to obtain coverage for community-based services, which, owing to the currently limited delivery system, will require "wholesale transformation" in the amount and type of services available (10, p. 2223).

[1]In 2011, the top 10 languages spoken at home, aside from English, were Spanish, Chinese, Tagalog, Vietnamese, French, German, Korean, Arabic, Russian, and Italian (85).

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Opportunities from Federal Health Reform

Despite laws such as Title VI and the ADA, the continued lack of knowledge and enforcement leaves millions of LEP individuals and individuals with disabilities unable to access quality healthcare. The ACA includes provisions that should help address ongoing inequities.

In Section 9007, the ACA requires nonprofit hospitals to demonstrate their community benefit by conducting a community health needs assessment (CHNA) every three years and adopting an implementation strategy to meet identified needs [26 U.S.C. § 501(r)]. The CHNA process must include input from "persons who represent the broad interests of the community served by the hospital facility, including those with special knowledge of or expertise in public health." Because most hospitals (59%) are categorized as nonprofit organizations (104), CHNA provides an important opportunity to look at the health status and health care access of people living in the community and to improve overall health, both physical and mental.

In addition, Congress included a broad nondiscrimination provision in the ACA, enacted as Section 1557 (42 U.S.C. §18116). This provision extends the application of Title VI and Section 504 as well as Title IX of the Education Amendments of 1972 (20 U.S.C. §1681) and the Age Discrimination Act of 1975 (42 U.S.C. §6101) to

- any health program or activity receiving federal financial assistance, including credits, subsidies, or contracts of insurance;
- any program or activity administered by an executive agency (such as Medicare or the Federally Facilitated Marketplace); or
- any entity established under Title I of the ACA or its amendments.

This section protects individuals from discrimination and allows victims of discrimination to use the enforcement mechanisms contained in the civil rights statutes and to file lawsuits. The Department of Justice and the HHS have enforcement authority to act on individual complaints and to initiate investigations into alleged discrimination. This is directly applicable for Title VI cases because in *Alexander v. Sandoval* [532 U.S. 275 (2001)] the Supreme Court left administrative remedies as the only enforcement mechanism for individuals alleging disparate impact. The OCR has proposed regulations to implement Section 1557, which once finalized should strengthen enforcement of the ACA's nondiscrimination provision [HHS, Nondiscrimination in Health Programs and Activities, 80 Fed. Reg. 54171 (Sept. 8, 2015)].

Unfortunately, both covered entities and health care providers are not fully implementing the ACA requirements. For example, The AIDS Institute and the National Health Law Program filed a complaint with the HHS OCR against four Florida insurers alleging violations of Section 1557 (among other nondiscrimination laws) (87). The complaint alleged that these plans discriminated in their benefit design by placing in the highest tier of their formularies all medications—even generics—to treat HIV and AIDS, leading to inordinately high copayments (87). As alleged, the policy discouraged individuals with HIV and AIDS from enrolling in those health plans, a practice that unlawfully discriminates on the basis of disability (87). The complaint led the Florida Department of Insurance to require these insurers to amend their formularies for the 2016 plan year. Also, the HHS informed health plan providers that putting all medications for a specific condition or disease in the highest cost-sharing tier constitutes discrimination [HHS Notice of Benefit and Payment Parameters for 2016, Final Rule, 80 Fed. Reg. 10,750, 10,855 (Feb. 27, 2015)].

The United States has made progress by using civil rights and antidiscrimination laws to combat health inequity, but there is still a long road ahead to ensure that individuals seeking health insurance and access to high-quality health care do not face discrimination.

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CIVIL RIGHTS LAWS AS TOOLS TO IMPROVE PUBLIC HEALTH

Whereas the health care sector focuses primarily on individuals' care and treatment, public health looks at the health of the broader population, the prevention of disease and disability, and the promotion of health and conditions for people to be healthy (49). The US Constitution recognizes the government's role to provide for the common defense and promote the general welfare. These duties to the public arise during widespread events such as epidemics, natural disasters, and bioterrorism (39). The Tenth Amendment holds that powers that are not specifically provided to the federal government in the Constitution, including such police powers, are left to the states or the people (U.S. Const. amend. X). Protecting the public's health has traditionally been included in the state police powers.

Governmental Power to Protect Public Health: Immunizations and Emergency Preparedness

Governments are given latitude to protect and promote population health through the use of rational basis or reasonableness standards. Two examples of the government using these powers such that individual freedoms may be restricted are around immunizations and emergency preparedness. Traditional public health tools for resolving emergency situations include mandatory vaccinations, quarantine and isolation, surveillance, facility closures, allocation of scarce resources, and provision for temporary authority for volunteer engagement and assistance (41). Their use may create tension between societal and individual or economic interests, and often the collective interest predominates (40). Civil rights laws and their enforcement help put reasonable limits on the ability of the government or any party to violate protected rights whether owing to race, ethnicity, religion, or other factors (40).

The increased use of vaccinations is one of the greatest twentieth-century public health accomplishments in the United States (12). All states have legal requirements that mandate vaccinations for children, especially for school and child care entry, and they may also be in place for health care workers or during public health emergencies (17). *Jacobson v. Massachusetts* [197 U.S. 11 (1905)] held that mandatory vaccination laws were within the police powers of a state. States have adopted exemptions and waiver processes to account for medical, religious, and personal beliefs (17, 78) and may impose additional restrictions such as exclusion from activities, school, or work during outbreaks. Laws mandating vaccinations and eliminating all but medical waivers, such as the new California law [CA Senate Bill 277 (2015)] following a measles outbreak at Disneyland (111), should be evaluated to assess their health impact (69). Laws can also help to ensure that evidence-based and recommended vaccines are equally available and affordable for all, helping to reduce disparities and improve health (36).

The duty of the government to protect and defend its population is applied to public health emergencies such as hurricanes, foodborne outbreaks, flu pandemics, and bioterrorism. Federal emergency plans, mandated by the Pandemic and All-Hazards Preparedness Act [Pub. L. 109–417 (2006)] and state and local plans facilitate the government's ability to respond quickly and effectively (47). Governmental and health leaders may be delegated the responsibility to act through official declarations of public health emergencies or other special police powers (32, 47).

Courts recognize a duty for governments to proactively develop emergency preparedness plans that cover the entire population and, specifically, special-needs and low-income populations and communities of color. Disasters such as Hurricane Katrina and Sandy showed the disparate impact of these storms on populations with limited resources and abilities to escape or prepare (65). Los Angeles and New York City recently entered settlement agreements after they were found to have violated the ADA and state laws by not adequately protecting their disabled population in their

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preparedness plans (84). Planning and emergency preparedness legal provisions and challenges work to ensure that all groups are adequately protected from disease and/or disasters.

Public Health Research, Data Collection, and Surveillance to Promote Health Equity

Another important role for public health is to conduct research, collect data and surveillance information, and monitor and evaluate health status (50). Public health advances rely on curing and treating diseases and conditions and learning from challenges and responses. The Ebola epidemic is an example of where new treatments and immunizations were both developed and tested, and traditional processes were waived owing to exigency (41, 106). Regardless of the circumstances, scientific rigor in monitoring impact is crucial. Legal and procedural protections, such as Institutional Review Boards, need to be in place and enforced to protect study subjects, particularly when studies are applied to a limited population, such as only one racial or ethnic group [45 CFR 46 (2009)] (101). The unethical Tuskegee Syphilis Study in the 1930s illustrates the consequences of operating without these protections[2] (13).

With proper legal safeguards in place to protect individuals and to ensure that personal health information is secure, data showing inequities and health impact can help to provide the support needed to enforce existing laws and to encourage limited resources to be focused on actions to address disparities (96). A core public health activity, monitoring the health of a community and its population, can provide information about health and disparities (14). Data collection and the systematic surveillance and monitoring of diseases and conditions are components of this work. Similar observation and evaluation of laws and policies to determine which impact health and disparities—"legal surveillance" or epidemiology—can also provide a better picture of the impact of or need for civil rights protections (3, 23). This information needs to be carefully collected, protected, and representative of the changing and multicultural population in the United States. Legal protections should be enacted to help ensure that the data collected do not cause harmful or unintended consequences, such as disclosure or additional stigma that might prevent at-risk groups from freely sharing information about themselves and their families.

THE IMPACT OF CIVIL RIGHTS LAWS ON HEALTH WHERE PEOPLE LIVE, WORK, LEARN, AND PLAY

Where people live, work, learn, and play has immense impact on individual and community health (7). In addition to the health and health care sectors, an individual's environment and the social determinants of health play an important role. Social, economic, and racial characteristics of neighborhoods are linked to important health indicators such as mortality, disability, chronic diseases, mental health issues, and violence (7, 27). Factors including economic stability, education, neighborhoods and the built environment, and the social and community context all influence health (**Figure 1**). To illustrate the health impact of these areas, legal and policy issues around civil rights and housing, employment, education, and violence are highlighted below.

Housing

Historically, federal, state, and local governments, and the private sector, have tremendously affected housing policy in the United States by limiting housing options, especially for people of

[2]The Tuskegee Syphilis experiment was a US Public Health Service study, which started in 1932 and studied African American men for 40 years without either ensuring informed consent for this research or providing recommended treatment to study participants.

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color. Before 1948, communities used racially restrictive covenants to prohibit property sale and rental to certain racial groups [*Shelley v. Kraemer*, 334 U.S. 1, 20 (1948)]. After World War II, developers used low-interest Federal Housing Administration (FHA) and Veterans Administration mortgages to build thousands of single-family homes. African Americans were excluded from the program through the use of exclusionary zoning practices and racial restrictions in the FHA's homeowners' insurance program (1). Redlining[3] also steered white families to the suburbs and prevented people of color from purchasing in those prosperous areas. These discriminatory laws and policies also enabled primarily white homeowners to amass wealth through equity appreciation and to pass on this wealth to future generations. With the movement of white, resourced families to the suburbs, more traditional forms of federal housing assistance, such as public and subsidized housing, and housing choice vouchers (commonly known as Section 8), were seen as primarily for people of color.

Today's low-income neighborhoods, still disproportionately made up of people of color, are the result of decades of discriminatory housing policies that led to highly segregated areas with concentrated poverty (7, 72). These communities face public health and environmental hazards and limited opportunities to be healthy. These hazards include a saturation of unhealthy options such as alcohol outlets, fast-food restaurants, and convenience stores, which sell primarily unhealthful foods and beverages and may charge high prices for healthful foods (58). Good public schools, transportation, and green and walkable spaces are not readily available for exercise. These factors contribute to low-income communities struggling disproportionately with high levels of obesity, asthma, malnutrition, and preventable diseases such as type 2 diabetes (72).

Community groups and advocates use multiple legal strategies, including filing lawsuits, proposing legislation, and mobilizing grassroots efforts, to end discriminatory housing practices, reduce concentrated poverty, and create opportunity areas. The Fair Housing Act of 1968 (TFHA) {Title VIII of the Civil Rights Act of 1968 [42 U.S.C. §§ 3601-3619 (2012)]} prohibits discrimination in the sale, rental, and financing of housing based on race, religion, national origin, sex, disability (added by amendment in 1988), and family status. It addresses both explicit discrimination and disparate-impact claims covering less blatant discrimination. The US Supreme Court recently noted that "disparate impact liability under TFHA also plays a role in uncovering discriminatory intent: It permits plaintiffs to counteract unconscious prejudices and disguised animus that escapes easy classification as disparate treatment" [*Texas Department of Housing and Community Affairs v. Inclusive Communities Project, Inc.*, 135 S. Ct. 2507 (2015)]. State and local laws may also prevent landlords from discriminating against people who pay rent using housing choice vouchers, Social Security, Supplemental Security Income, unemployment insurance, or veteran's benefits. Discrimination against housing choice voucher holders is often a guise for discrimination based on race, national origin, or familial status (98). These laws coupled with new governmental initiatives and strong community grassroots efforts are working to combat decades of discriminatory laws and policies.

Employment

Access to employment that provides a living wage and safe working conditions is directly linked to health. Higher incomes provide access to healthful food, preventive medical care, safe housing, and reliable, safe transportation (22). But, according to a recent report, "[o]nly 52% of workers

[3] Redlining refers to the discriminatory practice that diverted mortgage funds away from urban, African American neighborhoods and toward white, middle-class neighborhoods (for a general historical examination of redlining, see 46).

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of color earn a living wage of $15 per hour or more, . . . , enough for a single adult to make ends meet" (45, p. 1), making the affordability of a healthy lifestyle elusive for many.

Work policies also impact health. For example, 40% of private-sector workers and more than 80% of low-wage workers do not have access to paid sick leave to care for themselves or a family member during illness (77); state sick leave laws and policies vary greatly (76). This makes employees less likely to be able to seek out preventive care or to stay home when they are sick.

Finally, factors in the workplace—including work in hazardous jobs, access to safety equipment, and exposure to toxins—clearly impact health. Two of the country's most dangerous jobs, agriculture and construction, are disproportionately performed by people of color, making their likelihood of suffering a workplace injury much higher than that of whites (20).

Workers, unions, and workers' advocates have long advocated for a higher minimum wage, paid sick leave policies, and better enforcement of workplace safety regulations at both the state and the federal levels. Despite opposition from employers about the costs of these measures, workers and their advocates have made significant gains at the state and local level on minimum wage and paid sick leave (30, 76), although worker safety measures are stalled at the federal level (74).

Education

Education is seen as the great equalizer: It brings people out of poverty and opens doors to opportunities. The federal government commits substantial funds to support public education and to ensure equal access for all children to prepare them for active community engagement (70). In *Brown v. Board of Education*, the US Supreme Court referred to education as "perhaps the most important function of state and local governments" [347 U.S. 483, 493 (1954)]. Education has an important impact on health as well. The *Guide to Community Preventive Services* found that interventions such as high school completion programs are strongly linked to improved long-term health and health equity (43). As a person's level of education increases, their health status increases (21) and their chances of becoming incarcerated decrease (55).

Schools are critical to health and opportunity. Low-income communities often have a high number of low-performing schools with an increased use of suspension and expulsion. These harsh measures often lead students to the "school to prison pipeline" (the "pipeline")[4] and to unsafe schools because of bullying. Overuse of punitive and exclusionary policies such as zero-tolerance policies are disproportionately used on children of color; lesbian, gay, bisexual, transgender, and queer (LGBTQ) students; and children with disabilities (100). These children are more likely to be suspended or expelled than their peers are for the same behavior. Suspension and expulsion not only deny students instruction, but also may place these students on the pathway to low-wage work, unemployment, and incarceration (26).

Legal advocates have used the Equal Protection Clause of the Fourteenth Amendment (U.S. Const. amend XIV), Title VI of the Civil Rights Act of 1964, and state equal protection and right to education clauses to address the disparities in administration of zero-tolerance or other exclusionary policies. However, litigating under these laws presents numerous hurdles, including the ability to secure an attorney, to show that an act was discriminatory against a protected class, and to have the time and resources to dedicate to litigation (70). Because of these limitations, holistic tools such as mediation, peer counseling, and restorative justice are being used more frequently (9).

[4]The school-to-prison pipeline is the systematic process through which a wide variety of education and criminal justice policies and practices result in students being pushed out of school and into prison (see 92).

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INCARCERATION AND INSTITUTIONALIZATION

Incarceration significantly impacts health, health care, and society. In 2013, more than 1.5 million people in the United States were incarcerated, with blacks and Latinos/Hispanics disproportionately represented (11). The incarcerated tend to be less healthy and experience greater rates of mental illness and substance abuse problems (55). As individuals in this group cycle through confinement and return to their communities, their health concerns have societal implications (91). Incarcerated individuals have a right to health care and treatment, but litigation has been required to ensure adequate care (83). Continuity of care for physical and behavioral conditions can be challenging, so reentry planning should include screening and enrollment in health insurance coverage, whether through Medicaid or an exchange (4). This strategy will prevent the incarcerated and their families from suffering due to lost support and income, mental health issues, stress, and uncertainty.

Recognition of the disparities and inequities in the United States around charging of crimes, sentencing, detention, and policies such as the three-strikes laws, which impose harsh mandatory sentences for repeat offenders, recently spurred federal and state reforms (34). One example is California's Proposition 47, which reduces penalties for nonserious and nonviolent drug and property crimes and modifies policies with disparate impact on marginalized populations {Safe Neighborhoods and Schools Act of 2014 [Cal. Gov. Code §§ 7599.1–7599.2 (2014)]}.

Violence and Intimate Partner Violence

Violence is a significant problem in the United States; more than one million violent crimes occur each year (31), and homicide and suicide are consistently among the leading causes of death for American youth and adults (18). Young males and racial and ethnic minorities face a disproportionate burden of violence (28). Violence has been recognized as a public health issue both in the United States and globally because it is preventable, requires multisectoral approaches, and can be addressed societally (33, 60). An example of violence occurring where we "live" is intimate partner violence (IPV)[5]. An estimated 42 million women experience physical violence, rape, and/or stalking by an intimate partner during their lifetime (80). Survivors of IPV and children witnessing violence report significant negative health impacts such as post-traumatic stress disorder symptoms, chronic pain, and other related conditions (86).

A myriad of federal and state laws provide crucial support, safety, and long-term assistance to survivors of IPV. However, factors such as poverty, cultural and religious differences, language barriers, sexual orientation, and gender identity can lead to a disparate application of IPV laws. People of color and immigrants, documented and undocumented, may also be left vulnerable because of concerns about the fairness of the criminal justice system and law enforcement and because of fears of deportation and discrimination. Federal and state IPV laws should recognize a diversity of intimate relationships and account for the experiences of people of color, immigrants, and the LGBTQ community.

SOCIAL AND COMMUNITY CONTEXT: MOVEMENT BUILDING AND CIVIL RIGHTS LAWS

The social and community environment is also critical to health. Social cohesion, civic participation, perceptions of discrimination and equity, incarceration, and institutionalization can greatly

[5]The term intimate partner violence describes physical, sexual, or psychological harm by a current or former partner or spouse. This type of violence can occur among "heterosexual or same-sex couples and does not require sexual intimacy" (16). IPV can also be referred to as family violence, and in most state statutes it is simply called domestic violence.

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impact the health of a population (103) (**Figure 1**), and law and policies can play an important role. Advocacy and citizen engagement are important in addressing these factors, protecting and promoting health, and ensuring that policies and laws meet community needs. Methods for civil rights advocacy have evolved over time, and new techniques, including the use of technology and social media to facilitate communications and build momentum for change, now augment traditional strategies. These innovative tools afford civil rights advocates the ability to reframe the conventional narrative, to tell their own stories, and to control their own messages. The impact is powerful because communication tools, such as cell phones and the Internet, have made communication ubiquitous and instantaneous.

There is particular traction with youth. Consider the examples of the Dreamers, undocumented young people brought to the United States as children who may be barred from higher education and employment because of their immigration status (38, 89), or the Black Lives Matter campaign, organized by young African Americans (51). These groups used social media channels such as Twitter to advocate for civil rights and have changed perceptions, created policy change, and encouraged millions to move toward action and activism (38).

Another innovation aiding advocacy is the ability to use data to document the impact of discriminatory policies and practices. Rooted in technology, geographic information system (GIS) mapping and other data systems and platforms can demonstrate where disparities occur in context with other variables, such as demographic changes (94). These tools enable groups to examine past and current conditions and to make projections about the future, making arguments for policy change more compelling (see **http://nationalequityatlas.org/**). Civil rights advocacy is also rapidly becoming global. International campaigns for civil and human rights and solidarity can easily connect and communicate, and United Nations members can sign human rights treaties that create common obligations and standards (68).

PROMISING EFFORTS TO USE LAW AND POLICY TO ADDRESS HEALTH EQUITY AND DISPARITIES

In addition to the examples provided above, which show where law and policy can impact health, efforts to use law and policy to address disparities and protect rights are under way in communities across the United States. This action can be seen at the local level in Madison, Wisconsin; Portland, Oregon; Minneapolis, Minnesota; and Seattle, Washington; Seattle's Race and Social Justice Initiative (88) is one of the first efforts to eliminate racial disparities, achieve racial equity, and focus on structural racism. At the state level, Minnesota's Department of Health recently led a comprehensive effort, Advancing Health Equity in Minnesota (25), which focused on eliminating health disparities and evaluating how policies and practices impact these inequities. Recommendations included using a Health in All Policies approach by focusing resources where they can best impact equities, providing statewide leadership, and strengthening the use of data to support this work. Nongovernmental organizations can also play a role in protecting the rights of communities through civil rights laws. In Los Angeles, a multidisciplinary coalition's assessment of the discriminatory impact of physical education requirements, a state mandate, and variation in resources (teachers and facilities) in schools with higher Latino and minority attendees resulted in changes in policies and practice (37, 61). These communities are considering how best to use law and policy to support their populations, to advance health, and to eliminate inequities.

CONCLUSION

Civil rights remain a twenty-first-century imperative, just as they were throughout the twentieth century. The goals remain the same: to achieve the right for all to be heard and valued and to

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meet the needs of people from every sector of society. As we have discussed above, discrimination and mistreatment of certain groups in the United States, the impact of unjust application of laws, and, in some cases, the failure to enforce existing laws have resulted in inequities for marginalized populations in our society. Rapidly shifting demographics in the United States, like those of Europe, Australia, Canada, and other countries with net in-migration, create an imperative to act to address disparities, health inequities that result from societal barriers, and the social determinants of health (19). By 2044, the majority of Americans will be people of color. As has already been documented in some states such as California, the majority of youth are people of color (95; **http://nationalequityatlas.org/**). The implications are profound and require a multisector focus on health that plans for and addresses the needs of all groups and members of the population; failure to do so could impact health outcomes and threaten the nation's economic vitality and health. The American experience calls for continued efforts to make progress because a nation can prosper only when it lives up to shared aspirations and makes good on the promise of guaranteeing civil rights to all. Laws and policies will remain integral to achieving this goal.

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FUTURE DIRECTIONS

1. Additional empirical and qualitative research around the impact of laws and policies that attempt to address disparities is needed.
2. Future research should investigate the impacts of the ACA, including its implementation and enforcement, on health and disparities. Such research should include a special focus on Section 1557.
3. Continued research (e.g., Matsuura or Leonard) is needed to evaluate how legal provisions (whether in constitutions, regulations, or judicial interpretations) protect or promote health and impact health outcomes.
4. Resources are essential to provide for needed surveillance for civil rights and health equity laws and protections and their related health outcomes.
5. Additional research and capability are necessary to capture diversity in populations, demographics, and SES more regularly and with more specificity to allow better comparisons between groups, to take into account more risk factors, and to highlight when inequities and health disparities are occurring.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review. The findings, conclusions, and opinions in this publication are those of the authors and do not necessarily represent the views of the US Department of Health and Human Services or the authors' affiliated institutions. This activity is in no way sanctioned or endorsed by the Department or the United States.

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RELATED RESOURCES

National Equity Atlas (**http://nationalequityatlas.org/data-summaries**). We invite readers to review additional resources from the National Equity Atlas, which also provides opportunities to manipulate data. In particular, we recommend the following sections: "Diversity is Increasing," "Communities of Color are Driving Growth," and "Economic Benefits of Equity" (**http://nationalequityatlas.org/indicators?ind=7261.**)

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Health Equity
Volume 2.1, 2018
DOI: 10.1089/heq.2017.0045

Health Equity

Mary Ann Liebert, Inc. publishers

NARRATIVE REVIEW Open Access

Racism, African American Women, and Their Sexual and Reproductive Health: A Review of Historical and Contemporary Evidence and Implications for Health Equity

Cynthia Prather,[1,*] Taleria R. Fuller,[2] William L. Jeffries, IV,[1] Khiya J. Marshall,[3] A. Vyann Howell,[1] Angela Belyue-Umole,[1] and Winifred King[4]

Abstract

Background: The sexual and reproductive health of African American women has been compromised due to multiple experiences of racism, including discriminatory healthcare practices from slavery through the post-Civil Rights era. However, studies rarely consider how the historical underpinnings of racism negatively influence the present-day health outcomes of African American women. Although some improvements to ensure equitable healthcare have been made, these historical influences provide an unexplored context for illuminating present-day epidemiology of sexual and reproductive health disparities among African American women.

Methods: To account for the unique healthcare experiences influenced by racism, including healthcare provision, we searched online databases for peer-reviewed sources and books published in English only. We explored the link between historical and current experiences of racism and sexual and reproductive health outcomes.

Results: The legacy of medical experimentation and inadequate healthcare coupled with social determinants has exacerbated African American women's complex relationship with healthcare systems. The social determinants of health associated with institutionalized and interpersonal racism, including poverty, unemployment, and residential segregation, may make African American women more vulnerable to disparate sexual and reproductive health outcomes.

Conclusions: The development of innovative models and strategies to improve the health of African American women may be informed by an understanding of the historical and enduring legacy of racism in the United States. Addressing sexual and reproductive health through a historical lens and ensuring the implementation of culturally appropriate programs, research, and treatment efforts will likely move public health toward achieving health equity. Furthermore, it is necessary to develop interventions that address the intersection of the social determinants of health that contribute to sexual and reproductive health inequities.

Keywords: African American women; racism; sexual and reproductive health

What happened on that auction block centuries ago is still unfinished business for African American women today.

—Dr. Gail E. Wyatt[1]

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Introduction

Racism in the United States is pervasive and is a major contributor to sexual and reproductive health disparities of African American women. The historical narrative about racial inferiority has exacerbated discriminatory healthcare practices, in turn negatively affecting the quality and types of healthcare provided to African American women.[2–6] According to the Centers for Disease Control and Prevention (CDC), African American women experience a high burden of maternal mortality, infant mortality, and sexually transmitted infections (STI), including HIV.[4–9] Furthermore, racism is a fundamental determinant of health status because it contributes to social inequalities (e.g., poverty) that shape health behaviors, access to healthcare, and interactions with medical professionals.[3,10,11]

Although legalized slavery, the most salient manifestation of race-based mistreatment for African Americans, ended in 1865, racism persists in institutions (e.g., criminal justice system), and attitudes that marginalize African American women.[4,12,13] For this reason, a historical analysis might shed light on how current sexual and reproductive health outcomes for African American women are shaped by racism and inform public health interventions to improve outcomes and promote health equity.

Methods

First, we highlight a combination of significant historical events throughout four key eras that play a role in current health outcomes, including slavery, Black Codes/Jim Crow, Civil Rights, and post-Civil Rights (present day). The authors posit that a combination of these race-based events across eras impacts the current reproductive and sexual health status of African American women. We searched online databases (e.g., PubMed) for peer-reviewed sources and books published in English only. To account for the unique healthcare experiences influenced by racism, including healthcare provision and research, our search was limited to the United States only. Second, we describe contemporary sexual and reproductive health outcomes. Third, we explore the link between these historical experiences and current sexual and reproductive health outcomes. Finally, we discuss the potential benefit for public health interventions that acknowledge the historical and current health status and healthcare experiences of African American women, and interventions that promote health equity.

We argue that a careful examination of historical factors is essential to effectively address the current healthcare needs of African American women especially as they relate to chronic stress and impacts on health outcomes across a variety of conditions potentially rooted in racism, including STI (e.g., HIV) and pregnancy-related morbidity and mortality. If past influences that have potentially shaped current outcomes are not taken into consideration, then public health efforts may neglect the impact of larger, contextual factors that affect health and contribute to inequities. Given the nature of this article, our review was considered exempt by the institutional review board and not required.

Results

Key historical considerations: slavery to present

Figure 1 presents a time period spanning 399 years (1619–2018) beginning in 1619 when enslaved Africans

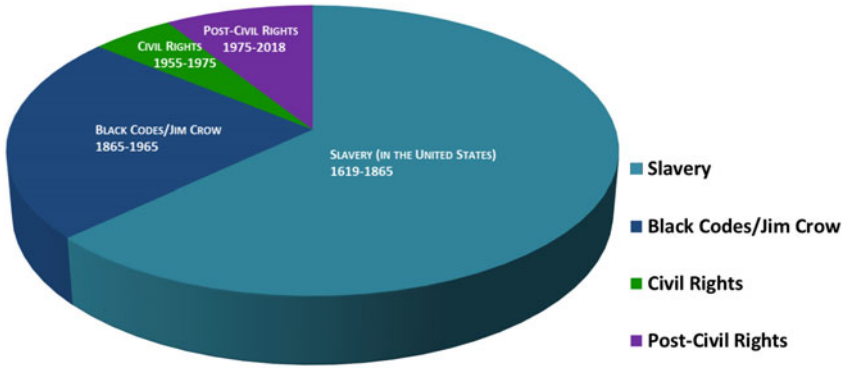


FIG. 1. Key periods of Africans and their American descendants in the United States.

were brought to the United States and includes slavery, Black Codes/Jim Crow, Civil Rights, and post-Civil Rights.[14] Table 1 provides a summary of adverse lived personal experiences and health exposures of African American women during four different time periods. We argue that the race-based experiences of these women underlie many of their sexual and reproductive health conditions.

Race-based mistreatment that occurred during the 246-year enslavement (1619–1865) of Africans and their descendants involved many sexual and reproductive acts of violence against both enslaved African American women and their sexual partners. Enslaved women often experienced legalized sexual and reproductive exploitation.[15–19] Some sources estimate that 58% of all enslaved women aged 15–30 years were sexually assaulted by slave owners and other white men.[15,20] Due to laws defining them as property, enslaved women had no legal protection from sexual assault by white men.[19]

Acts of sexual violence against African American men could also affect enslaved women. Because enslaved men were viewed as social threats, and had few criminal justice protections, mobs of white men publicly lynched and/or castrated them in efforts to assert their dominance over them.[21] In addition to disrupting relationships between enslaved women and their male partners, such occurrences restricted their opportunities to reproduce with a partner of their choosing.

Consequently, childbearing during slavery was often intrinsically related to an economic system that benefitted white slave owners more so than a matter of personal freedom.[15,22] Because enslaved women and girls were denied reproductive rights to control their own sexuality, they were unable to determine with whom they engaged in sexual relationships.[23,24] Women who were considered "strong" were sold as breeders and routinely sexually assaulted to birth more children into slavery.[23] Some enslaved females attempted to avoid being sexually exploited for these purposes and aborted their pregnancies as an act of resistance.[23,25,26]

Enslaved women had limited access to healthcare, and the available "care" often involved medical experimentation.[27] James Marion Sims, the "Father of Modern Gynecology" and former president of the American Medical Association, performed many reproductive experimental surgeries without anesthesia to treat various childbirth illnesses among enslaved African American women.[28] Many physicians used enslaved women in other experimental reproductive surgeries, such as

Table 1. Historical and Contemporary Sexual- And Reproductive-Related Health and Healthcare Experiences of African American Women

Period	Time span	No. of years	Personal experiences of AAW that contribute to disparities in sexual and reproductive health	Healthcare experiences of AAW that contribute to disparities
Slavery	1619–1865	246	Public, nude physical auction examinations to determine reproductive ability[15,20]; raped for sexual pleasure and economic purpose[19,23]; purposely aborting pregnancies where rape occurred; Jezebel stereotype emerged of black women being hypersexual[115]; generational poverty	Nonconsensual gynecological and reproductive surgeries performed at times repeatedly on female slaves without anesthesia, including cesarean sections and ovariotomy to perfect medical procedures[27,28]
Black Codes/ Jim Crow	1865–1965	100	Rape[35]; lynching (genitalia/reproductive mutilation)[36,37,40]; uncertain/unequal civil rights[35]; stereotypes and negative media portrayals continued; generational poverty	Nonconsensual medical experiments continued[27]; poor or no healthcare for impoverished blacks; compulsory sterilization[47]; Jim Crow laws enforced lack of access to quality healthcare services and opportunities; effects of Tuskegee Untreated Syphilis Study on women[49,50]
Civil Rights	1955–1975	20	Lynching, uncertain/unequal civil rights and violence against women to show superiority and control[35]; stereotypes and negative hypersexual media portrayals continued; generational poverty	Nonconsensual medical experiments continued[27,132]; compulsory sterilization[47]; effects of Tuskegee Untreated Syphilis Study on women[50]; unequal healthcare services[30]
Post-Civil Rights	1975–2018	43	Black exploitation movies, media's hypersexual images continued[116–117]; generational poverty	Unequal healthcare continued[30]; targeted sterilizations, hysterectomies, abortions, and birth control[42,43,47,53,54]
Total no. of years	1619–2018	399		

AAW, African American Women.

cesarean sections and ovariotomy, to perfect procedures that would later be used for all women.[29]

Adverse sexual and reproductive health and healthcare experiences continued for African American women throughout the Black Codes/Jim Crow era. (Table 1).[24,30,31] Although the Emancipation Proclamation granted freedom to the enslaved, the Black Codes restricted African Americans' labor advancement and migration, and Jim Crow laws restricted their overall civil rights.[32,33] In some states, laws regarding rape protected only white women although some sources contend that African American women were more often victimized by this crime.[21] In the absence of laws to protect African American women, rape served to control them, which likely affected their self-esteem and self-worth.[34] Lynching was also used to punish both women and men who sought racial equality through civil rights.[24,35,36] Many African American women also endured public gang rape and genital mutilation before being lynched.[37–40]

Furthermore, eugenic programs emerged to control the size of the black population.[41–43] These programs coerced African American women to undergo sterilizations without their full knowledge that these procedures were not reversible.[44] Although the eugenic thesis was refuted by scientists, several state-supported eugenic sterilization programs remained active.[45,46] Thirty states supported formal eugenic programs that enforced compulsory sterilization from the early 1900s to the 1970s.[47]

The longest running medical experiment in the United States was the "Tuskegee Syphilis Study of Untreated Syphilis in the Male Negro."[48] Beginning in 1932, the U.S. Public Health Service recruited poor and uneducated African American men in Alabama to determine the effect of untreated syphilis. Although treatment became available, the men were misled, denied treatment, and not informed of the study findings until 1972.[49] In addition to study subjects experiencing syphilis-related morbidity and mortality, some of their wives acquired syphilis, and some of their children suffered complications from congenital syphilis.[50]

Inhumane healthcare provided during the Black Codes/Jim Crow era was replaced with limited, poor-quality, or no health services for many African Americans, particularly those living in poverty during the Civil Rights era.[30] Both the Civil Rights and post-Civil Rights eras have been characterized by overt and subtle forms of racism in the U.S. healthcare system. Legal segregation in healthcare continued through the mid-1960s until Congress passed the Civil Rights Act of 1964.[51] Shortly thereafter, the Medicaid program forced many hospitals to adhere to the Civil Rights Act and to hire doctors who would treat patients of all races, although unequally.[51] Federal funding supported coerced sterilization, and some African American women were threatened with denial of medical care or termination of welfare benefits if they did not undergo sterilization.[52] Moreover, in 1972, ~20 women, mostly young, African American and poor, suffered unintentional abortions as a result of the super coil. The super coil was a device that caused uncontrollable bleeding and, in some cases, led to hysterectomies, abdominal pain, and anemia.[53]

In addition, many poor African American women underwent unnecessary hysterectomies as practice for medical students at select teaching hospitals.[54] This exploitation of African American women became routine and perpetuated the eugenic movement during this time period.[47] Although long-acting reversible contraceptives (i.e., implants) are now recommended as the most effective contraception option for many women, including adolescents regardless of race/ethnicity, debates about reproductive justice and the use of these contraceptives among African American women persist.[55,56] African American women also report experiences of racial discrimination when seeking family planning services, and are more likely than white women to be advised to restrict childbearing, which might engender feelings of mistrust.[57–60] Likewise, black women of low socioeconomic status (SES) were more likely than white women of low SES to be recommended by their healthcare provider for intrauterine contraception.[61]

Taken together, these historical experiences of sexual violence, experimentation, and healthcare disenfranchisement support the intergenerational transmission of poor sexual and reproductive health outcomes among African American women in the United States.

Contemporary sexual and reproductive health outcomes

The CDC reports that African American women experience a high burden of STIs, including HIV.[62] In 2012, compared with white women, African American women were more likely to be diagnosed with primary or secondary syphilis, gonorrhea, or chlamydia (16.3, 13.8, and 6.2 times, respectively).[62] African American women were also two to three times as likely as white women to have pelvic inflammatory disease.[62] If left undiagnosed or untreated, these conditions can lead to pregnancy complications and infertility.[62] In addition,

CDC reported that African American women had an HIV incidence rate that was 20.1 times greater than that of white women in 2010.[63] African American women are also more likely to have delayed HIV treatment compared with women of other races.[64]

Pregnancy-related morbidity and mortality also disproportionately affect African American women.[65,66] In 2013, CDC reported that the preterm rate for black infants was ~60% higher than for white infants (17.1% and 10.8% respectively).[67] In addition, the low birth weight rate for African Americans was 10.13% and 6.97% for whites.[68] During 1998–2005, African American women had a three to four times higher risk of pregnancy-related death at every age interval compared with women of other races.[69] African American women also have increased risk for pregnancy-related hypertension and chronic hypertension.[70] Importantly, this increased risk of mortality suggests that African American women are less likely to receive quality prenatal care and other preventive services (e.g., preconception health counseling and quality care for pre-existing medical conditions such as hypertension).[71]

African American women undergo more hysterectomies due to conditions (e.g., uterine fibroids) that are potentially treatable by less aggressive procedures than other women.[72–74] Kjerulff et al. also found that black women were more likely than other women to have longer hospital stays and three times the inhospital mortalities, as well as other complications (i.e., respiratory, postoperative infection, gastrointestinal, hemorrhage, hematoma, accidental puncture, or laceration).[74]

Researchers are urged to examine any biases they may have about African American women before interpreting data about their sexual and reproductive health. Although focused on African American men, Leigh and Huff outline important considerations regarding reporting bias that are pertinent for African American women.[75] First, racism is a social factor embedded within the historical legacy of the United States.[57,75,76] The effects of racism and unconscious bias are difficult for African American women to avoid, because race and ultimately racism are based on physical characteristics (i.e., skin color). Whether racism is internalized, experienced within institutions (i.e., workplace), or through societal assumptions (i.e., preconceived notions about racial groups), it increases the risks of adverse sexual and reproductive health outcomes for this population.[77] Second, there may be a reporting bias related to African Americans, because African Americans disproportionately access medical care in publicly funded clinics due to socioeconomic disparities. These clinics typically have more stringent reporting requirements.[75] Finally, differences in sexual and reproductive health may be exaggerated as African Americans may be more likely to use service providers who use different patterns of testing and reporting.[51]

For example, healthcare systems that emphasize teaching and research related to patient care may have a higher proportion of African American patients, which can lead to the identification of health problems believed to be more common among African Americans (e.g., STIs).[51] In light of the nuances associated with the collection, analysis, interpretation, and reporting of health data for African American women, some researchers argue that there is an intersection between the health and healthcare experiences of African Americans and the social conditions (e.g., poverty, limited education, residential segregation) they live in, helping shape patterns of documented health inequities, including sexual and reproductive health inequities.[78–81]

Linking past experiences to current health outcomes

The historical context of racism continues to shape the sexual and reproductive health of African American women. Figure 2 is a visual representation of key historical and contemporary social conditions experienced by African American women in the United States. It demonstrates the trajectory of adverse social determinants (i.e., poverty), which may affect the current health status of African American women. Although improvements in the public health and the healthcare system have occurred over time, the following paragraphs discuss the continuum of racism-related experiences that began in slavery and have been found to influence sexual and reproductive health today.

Transgenerational poverty originated in slavery and continues to disproportionately affect African Americans.[82] Given the well-established link between racism, poverty, and health, the socioeconomic conditions associated with institutionalized and interpersonal racism make African American women more vulnerable to sexual and reproductive health problems.[81] For example, African American women are more likely than other women to live in neighborhoods in which the HIV prevalence is relatively high,[83] increasing the likelihood that they will encounter HIV-infected partners.[84]

Limited education may contribute to health issues experienced by African American women. During slavery, laws prohibited enslaved women from receiving a

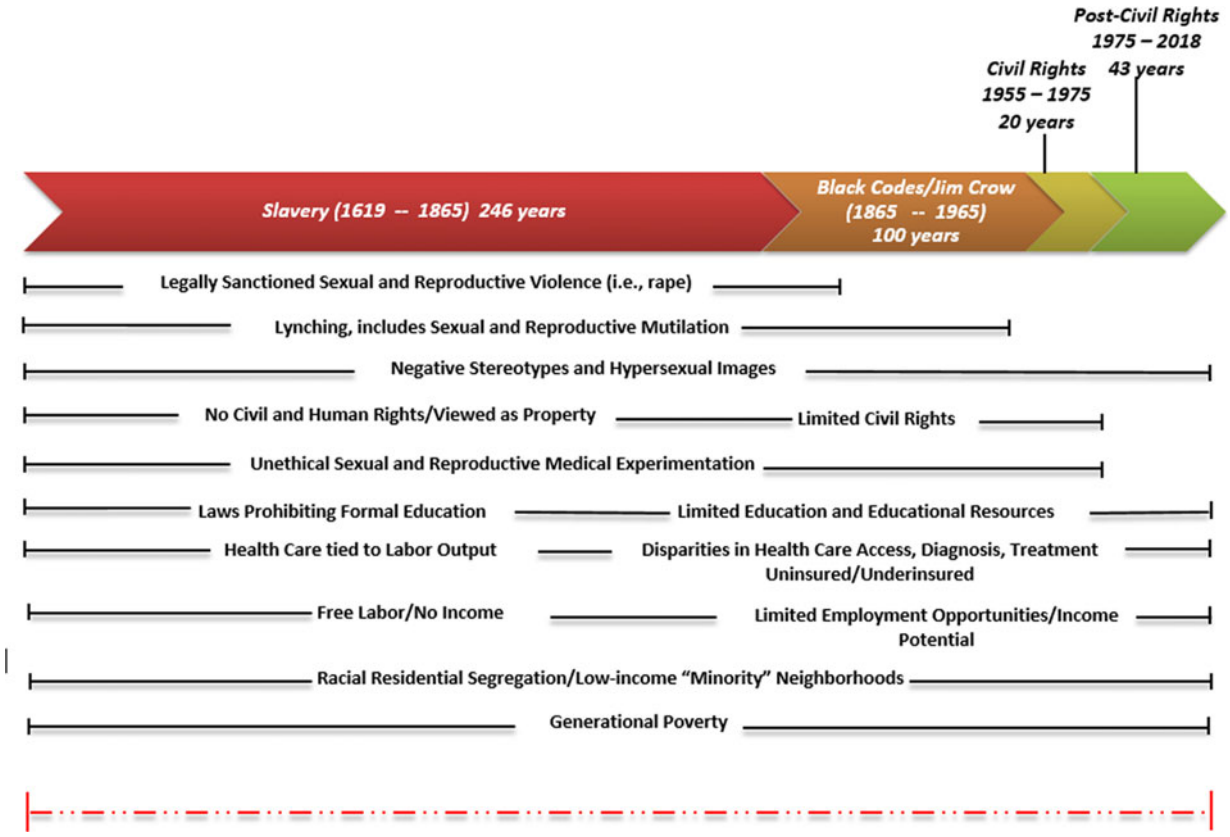


FIG. 2. Time line of key historical and contemporary racial and social experiences of Africans and their American descendants in the United States.

formal education.[14] In later periods, most African American women had few opportunities for formal education, and black schools were given lower quality educational materials than schools educating white students. Low educational attainment may be associated with multiple sexual and reproductive health issues.[85–88] Studies show that limited education is associated with an increased likelihood of poor HIV treatment adherence, preterm births and infant mortality, and undergoing hysterectomy.[89–91] Furthermore, the frequency of hysterectomies among African American women with poor education has amplified concerns about the frequency with which this procedure is used.[91,92]

Race-based residential segregation continues to differentially structure access to quality educational opportunities in many predominantly African American neighborhoods.[93,94] Ultimately, residential segregation by race provides a foundation to maintain other forms of institutional and societal segregation.[80] Importantly, it plays a central role in reproductive and sexual health by limiting access to quality health services.[95,96] For example, African Americans living in predominantly black communities are considerably less likely to receive early HIV testing and treatment than whites.[64,97] In addition, residential segregation is linked with adverse reproductive health outcomes, which are rooted in social inequalities.[98]

Some researchers have discussed structural inequalities in employment opportunities in relation to sexual and reproductive health outcomes. Historically (i.e., during slavery), African American women were not compensated for the work they performed. As slavery came to an end, they were not provided access to resources or immediate employment opportunities to sustain themselves and their families.[99] Low-paying jobs with few opportunities for advancement have been found to influence decision-making around sexual behavior. Poverty is

associated with sexual risk decisions in efforts to acquire basic needs, such as food and shelter.[100–103]

A personal history of sexual violence may also influence the overall health of African American women.[104,105] Repeated assaults have been linked to trauma, which can increase the likelihood that women will experience sexual health problems (e.g., sexual dysfunction).[106–108] African American women living in poverty have an increased likelihood of enduring childhood sexual abuse.[109] Furthermore, reproductive coercion diminishes self-esteem, resulting in feelings of inferiority, high levels of stress, and vulnerability to sexual risk behaviors.[110]

Present-day stereotypes of African American women as "hypersexual," "aggressive," and "angry" were born of representations that emerged in the past.[133,107,111–113] Negative sexual stereotypes of African American women began as a means to justify their enslavement and subsequent sexual violence, including rape and sexual assault.[114] Negative sexual imagery of African American women continued throughout the four time periods.[115–117] Peterson et al. recently found that African American women who reported viewing more sexual stereotypes in rap videos engaged in more sexual risk behaviors than females who did not. Some data suggest that these negative stereotypes help to further racist sentiments because they can be internalized by African Americans.[118] Men of color who perpetuate these images either intentionally or unintentionally have themselves been victims of persistent negative imagery throughout history that often translates into internalized racism.[119]

Because many African American women lack access to quality healthcare, they have an increased likelihood of late-stage diagnoses of HIV and other medical conditions that increase the risk for early mortality.[30,120] Many African American women lack access to preventive reproductive screenings, including mammograms and Pap smears.[121] Some data suggest that factors contributing to disparities in preterm birth risk or infant mortality include differences in prenatal care, nutrition, and SES as well as experiences of racism-related stress.[65,121–125]

Some suggest the origins of adult health begin with intrauterine and early postnatal experiences or as a result of "weathering," through which repeated experiences with discrimination result in physical health deterioration in early adulthood.[126–129] Low birth weight among contemporary African Americans has been proposed to be a result of differences in current exposures to social and environmental factors that affect fetal development and from conditions experienced during slavery. Enslaved women endured poor health across their life span due to insufficient diet, extreme physical work, and disease.[130,131] Jasienska highlights the concept of "fetal programming," the idea that the physiological development of the fetus can be affected by environmental events, which may endure into adulthood, thereby affecting future generations. Although slavery was abolished in the United States in 1865, Jasienska argues that there has not been enough time to eliminate the physical effects of slavery, which contributes to the disproportionately high levels of low birth weight in African American infants born in the 21st century.[130] Although there are multiple risk factors for preterm birth and low birth weight, long-term, multigenerational exposure to inadequate nutrition as evidenced during slavery should be considered when addressing low birth rate.[130]

Additionally, the legacy of medical experimentation and inadequate healthcare has exacerbated African American women's complex relationship with healthcare systems, past and present, and laid a foundation of mistrust of the medical establishment.[132,133] Some researchers argue that the study of African Americans is incomplete if cultural mistrust is not taken into consideration.[134] Research suggests that African Americans are reluctant to engage in clinical trials and may refuse treatment as a result of their own race-related experiences.[133,135–137] The lingering effects of the "Tuskegee Study of Untreated Syphilis" on African American women support the need for present-day medical schools to adopt culturally and linguistically appropriate curricula that consider how this study continues to impact the reproductive health and related behaviors of African American women.[50]

Implications for public health

The historical and contemporary racism-related health and healthcare experiences of African American women to date highlight the need to develop new models for health promotion. Socioecological models are useful for understanding the context of both race-specific and gender-specific issues relative to sexual and reproductive healthcare experiences.[138] For example, programs designed to address individual-level (i.e., self-esteem, resilience), interpersonal-level (i.e., reducing stigma), community-level (i.e., reducing residential segregation), and importantly system-level factors (i.e., reducing unemployment) might facilitate long-term, sustainable improvements in health for the larger population of African American women.[139]

Consistent with strategies outlined in the Department of Health and Human Services Action Plan to

Reduce Racial and Ethnic Health Disparities and Healthy People 2020, we highlight the following strategies as first steps in reversing historical patterns of poor sexual and reproductive health outcomes among African American women: (1) ensure strategies focus on culturally and contextually appropriate research and prevention, (2) ensure equal access to effective sexual health information and quality healthcare services, (3) support quality education and training for public health professionals, and (4) support policies that promote sexual and reproductive health equity.

To ensure strategies incorporate culturally and contextually appropriate research and prevention, an understanding of cultural theories and perspectives is central to prevention efforts. This approach enables the development of programmatic systems and policy actions that are relevant and appropriate for the intended audience. African American women must be involved in the design, implementation, and evaluation of all aspects of the research and implementation of agreed-upon programs. Such an approach is modeled by community-based participatory research.[140] Similarly, it is important to closely examine macrolevel factors that impact health outcomes, such as the socioeconomic, cultural, and dimensions of the community/environmental context. This approach further illuminates the impact of social determinants of health on African American women and expands opportunities and strategies for primary prevention.

Addressing equal access to effective sexual and reproductive health information and quality healthcare services that stem from institutional racism and discrimination entails reducing barriers to access to quality care, increasing access to health insurance, and ensuring the provision of culturally appropriate and specialized care. The Affordable Care Act (ACA) could improve African American women's access to quality, affordable health coverage and help reduce inequities.[121] The ACA was designed to expand access for preventive screening services for women, increases maternity coverage, and increases funding to community health centers, which are generally located in disenfranchised communities serving large numbers of African Americans. Moreover, to effectively and efficiently address those underlying causes of adverse sexual and reproductive health outcomes for African American women, public health agencies are encouraged to broaden their partnerships to include nontraditional partners (i.e., housing, education, employment) who might have more direct influence over some of the social determinants affecting the health status of African American women.

Addressing the shortage of African American public health professionals and supporting quality education and training are significant in improving the provision of high-quality healthcare. Their representation in the workforce has both educational service and relationship benefits for patients and providers. In addition, ensuring their presence within the healthcare profession serves as an opportunity to address the discriminatory practices that may have prevented their entry into healthcare professions.[141,142] Patient/provider relationships are also a factor in achieving patient satisfaction and medication adherence.[143,144] Effective patient/provider communication is paramount to delivering high-quality health services, and patients are more apt to share information helpful to their provider when they feel valued.[145]

In addition, public health researchers should be familiar with the histories and lived experience of their African American patients to appropriately design collaborative prevention efforts that ameliorate racism and its health-related impacts among African American women. Learning to be culturally competent and sensitive is essential for providers and public health practitioners providing services to populations that have traditionally been marginalized and medically underserved.[145]

Moreover, policies that promote health equity can be powerful tools for social change. Enforcing policies that promote racial and gender equality, quality education for all students, equal access to job training and employment opportunities, and equal access to quality health care for all could enhance population health.[138,146,147]

Conclusion

The field of public health will be more successful addressing the root causes of health inequities when strategies are informed by rigorous social and epidemiological research. Properly framed and executed, such research can support the development of approaches that take into account the unique experiences of African American women. This overview of historical health-related experiences of African American women is a first step in describing how the historical impact of racism links past events to present sexual and reproductive health outcomes. Addressing sexual and reproductive health through a historical lens and ensuring the implementation of culturally appropriate programs, research, and treatment efforts will likely move public health

toward achieving health equity, which will benefit the health of African American women.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Author Disclosure Statement

No competing financial interests exist.

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Cite this article as: Prather C, Fuller TR, Jeffries IV WL, Marshall KJ, Howell AV, Belyue-Umole A, King W (2018) Racism, African American women, and their sexual and reproductive health: a review of historical and contemporary evidence and implications for health equity, *Health Equity* 2:1, 249–259, DOI: 10.1089/heq.2017.0045.

Abbreviations Used

ACA = Affordable Care Act
AAW = African American women
CDC = Centers for Disease Control and Prevention
SES = socioeconomic status
STI = sexually transmitted infections

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Hospitals and Civil Rights, 1945–1963: The Case of *Simkins v Moses H. Cone Memorial Hospital*

P. Preston Reynolds, MD, PhD

In the 1960s, the legacy of discrimination against black persons still existed in all areas of medicine. This historical analysis investigates the strategies that were used by lawyers alongside physicians, dentists, and patients in elevating health care for black persons. Primary resources include oral histories, government documents, hospital records, archival and personal manuscripts, and professional and hospital periodicals.

After World War II, leaders in the black community were determined to improve health care for black persons by ending discrimination in hospital policies and practices. Leaders of professional organizations developed a collaborative strategy that involved the court system, federal legislation, and research and education of the public and health professionals to integrate the hospital system rather than to expand the existing separate-but-equal system. Efforts culminated in the case of *Simkins v Moses H. Cone Memorial Hospital*; this case became the landmark decision by the U.S. Supreme Court and led to the elimination of segregated health care. Three months after the case, President Johnson ratified the Civil Rights Act of 1964, which included Title VI, thus extending the policy of equality to all federal programs. Laying a foundation for universal access to health care in the United States depended on a victory in the courts, in national health legislation, and in public opinion. All were achieved through strategic efforts to amass widespread support for the elimination of discrimination in medicine.

Ann Intern Med. 1997;126:898-906.

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In the 1960s, the legacy of discrimination still existed for black persons seeking admission to medical schools, appointments to the medical staff of hospitals, membership in medical societies, and access to hospital care (1–3). Hospitals that cared solely for black persons were inferior to those that cared for white persons (4–7), and facilities that were designated for black persons in mixed-race hospitals included and were sometimes limited to a basement, attic, or separate building behind the main hospital. Consequently, equality in health care remained an elusive dream for black persons until the stage was set for massive federal intervention.

This historical analysis addresses several questions. Why did black dentists, physicians, and patients pursue the integration of hospitals as a means to improve health care for black persons? Why did leaders in the black community work through the court system in laying the foundation for the racial integration of hospitals? What were the consequences of judicial decisions about the use of federal funds on executive action and legislative initiatives? This analysis also describes the federal grant system and effect of racism in federal funding on hospital practices. The case of *Simkins v Moses H. Cone Memorial Hospital* became the landmark decision leading to the elimination of segregated hospital care through Title VI of the 1964 Civil Rights Act and the Medicare program.

Hospitals: The Target for the Elimination of Discrimination in Medicine

At the close of World War II, Dr. Paul Cornely, Professor of Preventive Medicine at Howard University, was acting as consultant to the National Urban League and surveyed the health and social services that were offered to black persons in five cities—three in the North and two in the South. Beyond the general absence of social services for black persons in every city that he studied, Cornely found a significantly lower ratio of beds per person for black persons than for white persons. Existence of hospital beds, however, was no guarantee that black persons would be granted access to those beds (8). Two examples follow:

Near Dalton, Georgia, a woman was injured in a car crash. The closest hospital advertised "no Negroes," so an ambulance was summoned from 66 miles away to take her to the closest hospital that treated black persons. The woman, Juliette Derricott, died. She had been a national YWCA executive and Dean of Women at Hampton and Fisk College.

A 70-year-old man with white skin and blue-gray

See editorial comment on pp 910-912.

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eyes was hit by an automobile. The motorist who hit the man rushed him to Grady Municipal Hospital. The physician worked to save the patient's life while the family was notified of the accident. The first family member to arrive was the patient's son-in-law. When the physician saw the son-in-law, who was a nationally prominent black man, he declared, "What! Have we put a nigger in the white ward?" Still unconscious, the patient was wheeled across the street through the rain to the black ward in the old building; in the black ward, the patient died. He was the father-in-law of Walter White, executive director of the National Association for the Advancement of Colored People (NAACP).

Walter White came to know Dr. Louis Wright, another opponent of discrimination, through the work of the NAACP.

The NAACP and Louis T. Wright: Integration in Federal Grant Programs

Louis Tompkins Wright experienced overt discrimination while he was a student at Harvard Medical School from 1912 to 1915. Wright learned that he was not allowed to rotate to the obstetrics ward at the Boston Lying-in Hospital because the patients were white. Arrangements had been made for Wright with a local black obstetrician. Wright refused this option and argued that his tuition payment and the curriculum promised obstetrics at the Boston Lying-in Hospital. Supported by his classmates, Wright succeeded where previous students had failed. The last painful incident came when Wright, graduating cum laude and fourth in his class, was denied the right to march in the order of scholastic achievement because he was black (9).

Wright later became the Chair of Surgery at Harlem Hospital and chairman of the national board of directors of the NAACP. He directed the policies of the NAACP from 1935 until his death in 1952 and steered the organization through its campaign against discrimination in professional and public education. During his tenure, Wright established the National Health Committee to spearhead the NAACP's fight against separate-but-equal policies in hospital care (10, 11).

The NAACP quickly identified the abuse of the distribution of state and federal tax dollars to public institutions. In parallel, the NAACP Legal Defense and Education Fund directed its litigation activities toward ending the system of discrimination in education, beginning with higher education in the 1930s with the case of *Murray v University of Maryland*, followed by *Gaines v Canada* in 1939, *Sipuel v Board of Regents* in 1948, *McLaurin v Oklahoma State Regents* in 1948, and *Sweat v Painter* in 1950. The NAACP Legal Defense and Education Fund ultimately succeeded with its litigation strategy in *Brown v Board of Education of Topeka, Kansas* in 1954 (12, 13). The same strategy would be applied to achieve social change in health care.

Before World War II, 27 major grant statutes provided federal assistance for agriculture, public health, public assistance (welfare), education, unemployment, compensation, and employment services. After World War II, federal grants expanded substantially. State agencies were chosen as the channel through which federal dollars would flow to communities. Regulations, second in importance only to the statutes themselves, specified who could receive grants, under what conditions, for what purpose, subject to what criteria, and with what exceptions. Before Medicare, the largest federal grant program in health care after World War II was the Hospital Survey and Construction Act of 1946, commonly known as "Hill–Burton."

The Hill–Burton Act was designed to increase the number of hospital beds throughout the country, particularly in rural communities. Its sponsors were Senators Lister Hill of Alabama and Harold Burton of Ohio. The act authorized $75 million per year for 5 years beginning in 1947 (for grants to state agencies for hospital construction) plus $3 million per year (for state surveys of hospital facilities) (14). As a federal–state partnership, state agencies were given an initial grant to survey hospital needs and to develop a plan to apportion construction funds on the basis of population distribution and existing hospital beds. Federal dollars without control was the guiding principle.

The Hill–Burton Act sought to provide equal facilities for all citizens, but it allowed hospitals that were receiving federal funds to continue existing patterns of discrimination on the basis of a separate-but-equal provision in the legislation (15). Regulations for the Hill–Burton legislation reflected congressional discussions. They allowed states to develop statewide hospital plans that included segregated institutions if the state health-planning agency considered these facilities adequate for the population served. Hospital facilities that were built for separate populations were to be of similar quality for each population group and adequate to meet the needs of that group (15).

Facilities that were not constructed as separate but equal had to ensure access to all persons without discrimination. The Hill–Burton Act, as interpreted by the General Counsel of Health, Education, and Welfare, meant that no person could be denied admission because of race, creed, or color to that portion of the facility for which federal funds were used; however, the patient could be denied admission to other sections. It was also interpreted

to mean that no patient could be denied any service that was essential to his or her health; however, patients could be segregated in the facility by race, creed, or color, and professionally qualified persons could be denied staff privileges (15–17).

In practice, Hill–Burton funds were used by communities throughout the South to build hospitals that excluded black patients from admission and to prevent black physicians from caring for their patients once they were admitted to mixed-race hospitals. When such possibilities became real in Tallahassee, Atlanta, and Memphis, the NAACP Board of Directors required that the local NAACP chapters refuse support for the construction or expansion of a segregated Hill–Burton hospital. If this requirement was ignored, the national NAACP would revoke the local chapter's charter (18). Dr. Wright, as chairman of the NAACP Board of Directors, argued that the way to fight segregation in health care was to refuse to support its institutionalization, particularly when institutions were funded by tax dollars.

Over the years, two strategies emerged among the leaders of the black community to improve health care for black persons. One was a strategy of accommodation whereby black leaders would request through well-established patterns of civility, from the white business elite, monies for black institutions, such as hospitals. In Durham, North Carolina, this form of negotiation led to the construction of Lincoln Hospital, an all-black hospital, in 1901 and three subsequent expansions. In terms of investments, however, the differential between Watts Hospital, the all-white hospital in Durham, and Lincoln Hospital grew with each decade. By 1950, Watts Hospital's assets totaled more than $2 800 000, whereas Lincoln Hospital's assets reached only $740 000 (4, 5).

The other strategy was one of integration. In developing this strategy, Wright established the National Health Committee of the NAACP and worked with two faculty members from Howard University: Dr. Montague Cobb, Professor of Anatomy, and Dr. Paul Cornely. The three worked together to orchestrate a collaborative initiative among the NAACP; the National Medical Association; the National Urban League; and, when possible, the American Public Health Association. The NAACP Health Committee asked Cobb to direct its first two projects. Cobb's subsequent publications (19, 20) described a system of inferior medical schools and hospitals for black persons throughout the North and South that he thought were grossly inadequate to serve the medical needs of black persons. In this separate-but-equal medical system of hospital care and medical education, black persons would always be disadvantaged and would continue to fall further behind (19, 20).

By the early 1950s, Wright, Cobb, and Cornely determined that it was time for a direct attack on "what is perhaps the greatest of all discriminatory evils, differential treatment with respect to hospital facilities" (21). The NAACP joined with Cobb and Cornely to sponsor an annual meeting from 1957 to 1963, the Imhotep Conference, in which physicians, leaders of professional organizations, and members of the press were invited to discuss the racial integration of hospitals. The first step was to eliminate the separate-but-equal clause of the Hill–Burton Act. Wright laid the foundation by arguing for use of the courts as the critical component.

Hospital Integration: The Judicial Approach

The first case on hospital discrimination to reach the courts was brought by three black physicians from Wilmington, North Carolina: Dr. Hubert A. Eaton, Dr. Daniel C. Roane, and Dr. Samuel J. Gray. Two hospitals were available in Wilmington. James Walker Memorial Hospital admitted primarily white patients but also maintained about 25 beds for black patients in a separate building that was located in back of the main building; this annex had substandard lighting, heating, and ventilation. Sadly, Dr. Eaton considered these facilities better than those available at the second hospital in Wilmington, Community Hospital, which could accommodate 100 black patients. The medical staff at James Walker Memorial Hospital was composed of white persons, whereas the staff at Community Hospital was biracial. Eaton assumed that discrimination against black physicians existed at James Walker Memorial Hospital because it was a private institution (22).

In 1954, Eaton accidentally discovered that James Walker Memorial Hospital paid no city or county taxes. Thinking that the hospital was a public institution because it paid no taxes, Eaton applied for staff privileges. His application was rejected (23, 24). Eaton decided to seek legal counsel and hired Conrad O. Pearson, the lawyer for the North Carolina chapter of the NAACP Legal Defense and Education Fund who lived in Durham, and Robert Bond, a black lawyer from Wilmington. For the next year, Pearson and Bond gathered data; in 1956, they filed suit in North Carolina district court. The lawyers argued in *Eaton v Board of Managers of the James Walker Memorial Hospital* that because of the land contracts between the city and county and James Walker Memorial Hospital, contributions from the local governments to the hospital for maintenance and payment of services to the poor,

and the conditions of the will of James Walker about the hospital, discrimination of the physicians was unconstitutional under the Fourteenth Amendment (25–30).

Judge Donald L. Gilliam held the first hearing on the case 23 months after the suit was filed. The lawyers for James Walker Memorial Hospital moved to dismiss the case on the grounds that denial of staff privileges by the hospital medical board was not state action in the purview of the Fourteenth Amendment, and thus the litigation contained no basis for federal jurisdiction. One month later, the judge dismissed the case, ruling that the "act of discrimination did not constitute state action" (22, 30). On appeal, the United States Court of Appeals upheld the lower court's ruling. Before proceeding, Pearson asked the national office of the NAACP Legal Defense and Education Fund for advice and assistance.

Thurgood Marshall and Jack Greenberg, two of the most renowned and successful Fund lawyers, examined the case and quickly realized that a victory would set an extraordinary precedent. They agreed to take the case to the Supreme Court and filed a writ of certiorari, which is an order requiring a lower court to forward the records of a case to the higher court for review (31–36). In May 1959, the Supreme Court declined to issue the writ. The cause seemed lost until Marshall and Greenberg noted that they received dissents from three Supreme Court justices: Chief Justice Earl Warren, William O. Douglas, and William Brennan (37–39). This was very unusual; as a result, Marshall and Greenberg examined the potential for success if a rehearing was granted. Marshall and Greenberg discussed the case at length and ultimately decided not to petition the court for a rehearing (38). They speculated that a fourth judge did not dissent because of the likelihood that the Supreme Court would uphold the ruling of the lower courts.

Shortly after the Eaton case was closed, Greenberg received a phone call from Dr. George Simkins asking for advice about discrimination in a hospital that had used Hill–Burton funds to expand. Simkins, a dentist in Greensboro, North Carolina, wanted to treat one of his patients in the Moses H. Cone Memorial Hospital because this hospital offered better equipment and facilities (Interview with Simkins GC, 5 February 1989). Three hospitals were available to the citizens of Greensboro. The Wesley Long Community Hospital was a 78-bed hospital that had never admitted a black patient or accepted a black physician for staff privileges. L. Richardson Memorial Hospital was a 91-bed hospital that admitted only black patients; at this hospital, black physicians and dentists had admitting privileges and cared for their patients. The Moses H. Cone Memorial Hospital was a 300-bed hospital that admitted black patients for special procedures but refused staff privileges to black physicians (40).

What initially seems to be an insignificant event often turns out to be a seed of revolutionary change. So it was with Simkins, whose patient had an impacted molar and needed oral surgery. Simkins tried to admit his patient to L. Richardson Memorial Hospital, but no beds were available. Simkins' patient did not want to be treated by a white dentist; therefore, he refused to be admitted to Moses H. Cone Memorial Hospital. In frustration, George Simkins called Jack Greenberg (Interview with Simkins GC, 5 February 1989).

Simkins was a medical and political leader of his community. He was familiar with the resources of the NAACP Legal Defense and Education Fund and knew Thurgood Marshall and Jack Greenberg through his efforts to integrate the public golf courses and school system in Greensboro. Simkins served as president of the local NAACP chapter, an active and large chapter, and believed strongly in the integration approach to solving inequities in education and health care that was being pursued by the NAACP and the NAACP Legal Defense and Education Fund. Simkins, who had been successful in integrating other public institutions, called Greenberg and asked for advice on integrating Moses H. Cone Memorial Hospital or Wesley Long Community Hospital and opening these hospitals to black health professionals (40, 41; Interview with Simkins GC, 5 February 1989).

On Greenberg's recommendation, Simkins wrote to the administrators of both hospitals and requested an application for admitting privileges. He received an application for the Moses H. Cone Memorial Hospital, filled it out, and was subsequently turned down. He never received an application from the Wesley Long Community Hospital. Simkins also wrote to the Secretary of Health, Education, and Welfare, Arthur S. Fleming, complaining that both hospitals had used Hill–Burton money in the past and were to receive additional federal funds to expand although the hospitals discriminated against black physicians, dentists, and patients. Greenberg now had a case of discrimination in hospitals that had used Hill–Burton funds (42–48; Interview with Simkins GC. 5 February 1989).

Greenberg put Michael Meltsner, a young associate at the NAACP Legal Defense and Education Fund, in touch with Simkins to discuss obtaining other plaintiffs. Simkins enlisted the help of six black physicians, two other dentists, and two black patients. Meltsner was delighted with this outcome because the group would represent a unified black community to the courts (Interview with Meltsner M, 19 April 1989). The dentists and physicians all

requested applications for staff privileges at both hospitals, and all were turned down (49). One of the patients who was named as a plaintiff had a confirmed gastric ulcer and wanted a complete medical work-up done by his black physician using the best equipment available. Because he was black, the patient could not be admitted to Wesley Long Community Hospital; because his physician was black, the patient could not secure care from his physician if admitted to Moses H. Cone Memorial Hospital (34). Discrimination clearly existed. For Meltsner, the issue was not proving equality of services but proving state action in the activities of these predominantly white hospitals (Interview with Meltsner M, 19 April 1989). The Hill–Burton program was the link.

The Hill–Burton statute required that, to be eligible to receive federal funds, all states had to establish a statewide medical-care commission to develop a plan and to serve as the conduit of federal monies to communities. In North Carolina, the state legislature established the North Carolina Medical Care Commission "to provide for the licensing, inspection, and regulation of hospitals; to authorize subdivisions of government to construct, equip, operate, and maintain hospital facilities; and to provide adequate medical care to the people of the State of North Carolina." The Commission was also authorized to provide funds to nonprofit hospitals for the costs of charity care and to build a 4-year medical school and teaching hospital at the University of North Carolina (4, 5).

Meltsner recognized, however, that the Hill–Burton Act was originally designed to provide money to construct hospitals and was intended to limit federal participation in hospital operations; to argue otherwise was a departure from the status quo. Meltsner needed to build the case for state action in hospital care on the basis of state and federal controls as they applied to hospitals receiving Hill–Burton federal grants. This involvement and control would then become the centerpiece for arguments of protection under the Fifth and Fourteenth Amendments. In preparation, Meltsner studied the plan for allocation of hospital beds under the Hill–Burton program that had been developed by the North Carolina Medical Care Commission and noted that the Commission had approved expansion and renovation plans for the Moses H. Cone Memorial and Wesley Long Community Hospitals in 1954, 1959, 1960, and 1961 (40; Interview with Meltsner M, 19 April 1989).

At the time of the trial, Moses H. Cone Memorial Hospital had received $1 270 000, or 15% of its construction costs (in 1954 and 1960), under Hill–Burton and Wesley Long Community Hospital had received $1 950 000, or 50% of its construction costs for two expansions (in 1959 and 1961) (38). Meltsner built the case of state action on the fact that the Moses H. Cone Memorial Hospital and the Wesley Long Community Hospital were licensed by the state, had received Hill–Burton funds to expand their facilities, and had a tax-exempt status. Involvement in the Hill–Burton program was most important (48, 49; Interview with Greenberg J, 2 March 1989). As Meltsner argued in federal district court, participation in the Hill–Burton program subjected hospitals to elaborate patterns of state and federal government regulations. These included 1) the right of the federal government to recover part of its grant if the hospital at some future date no longer existed as a hospital; 2) the stipulation that hospitals receiving federal grants had to meet specified minimum standards for maintenance and operation; 3) the requirement that each state inventory all existing hospital facilities to determine the number of beds needed in each area and to prioritize projects; and 4) the stipulation that a state had to submit, for approval by the Surgeon General, a plan for hospital care that did not discriminate on the basis of race, creed, or color (48, 49). If a separate-but-equal facility was built, the state agency had to submit a report enumerating the number of beds that were available for each racial group to the Surgeon General. If the government was involved in hospitals using Hill–Burton funds, citizens were entitled to protection under the Fourteenth Amendment. As Meltsner argued, the Hill–Burton legislation was unconstitutional because separate but equal (as described in the Hospital and Survey Construction Act of 1946) was unconstitutional under the Fourteenth Amendment.

Greenberg and Meltsner were obligated by law to notify the Justice Department when a case before the courts challenged the constitutionality of a federal statute. When Burke Marshall, Assistant Attorney General, requested permission to intervene on behalf of the plaintiffs, Greenberg and Meltsner knew they had secured an important vote of support (Interview with Meltsner M, 19 April 1989; Interview with Greenberg J, 2 March 1989).

Pearson filed the suit, *Simkins v Moses H. Cone Memorial Hospital*, on 12 February 1962. The plaintiffs asked the court to order the hospitals to cease denying black physicians and dentists the use of hospital facilities on grounds of race; to cease denying the admission of patients on the basis of race; to cease refusing patients the permission to be treated by their own physicians and dentists; and to declare the separate-but-equal provisions of the Hill–Burton Act and its implementing regulations unconstitutional under the due process clause of the Fifth Amendment and the equal protection clause of the Fourteenth Amendment (50).

Burke Marshall submitted a 48-page brief to the Justice Department. He recommended that the courts overthrow the separate-but-equal provision of the Hill–Burton Act because it violated the Fifth and Fourteenth Amendments. Marshall argued that hospital care was not a private affair and elucidated many areas in which federal and state controls under the Hill–Burton program affected hospital operations (51). Two months earlier, the Federal Hospital Council, which was authorized to advise the Surgeon General on the Hill–Burton program, recommended that steps be taken at the federal level to ensure that patients would be admitted to federally aided hospitals without discrimination and that the Hill–Burton legislation be changed to reflect this policy. Council members argued that "there is no place for racial discrimination; it is unjust and detrimental to the physicians and patients involved, the professional staff of the hospital, and indeed, to the community at large when staff privileges are granted or denied on the basis of race" (54).

In December 1962, Judge Edwin M. Stanley ruled in favor of the defendants in the case of *Simkins v Moses H. Cone Memorial Hospital*. Stanley concluded that the courts did not have jurisdiction over civil rights activities as they related to hospitals, and the motion of the defendants to dismiss the case was therefore granted (49). Greenberg and Meltsner, however, were not disheartened. If the case was overturned by the Court of Appeals, more hospitals would be affected. In fact, 89 separate-but-equal hospitals, all-black or all-white facilities, had been built in the South with Hill–Burton dollars (54; Interview with Meltsner M, 19 April 1989; Interview with Greenberg J, 2 March 1989). The Legal Defense and Education Fund learned, during litigation of school cases, the importance of obtaining a Supreme Court ruling. Greenberg filed the appeal, and on 1 April 1963, he argued the case before the Fourth Circuit Court of Appeals. On 1 November 1963, the Circuit Court ruled in favor of the plaintiffs, granting them the relief they sought (48, 54–56).

Chief Judge Simon E. Sobeloff wrote the majority decision and found that the state government was involved in hospitals through extensive federal–state participation in hospital planning and through the appropriation of "millions of dollars of public monies." Meltsner's argument proved successful. The defendants appealed, and the Supreme Court's ruling was the next important step.

James Quigley, Assistant Secretary of the Department of Health, Education, and Welfare (DHEW), lent his support. Awaiting the Supreme Court's ruling on the *Simkins* case, Quigley wrote to Lee White, Special Assistant to President Johnson responsible for civil rights, asking for his counsel on implementation of the Hill–Burton program. As Quigley noted, the DHEW had eight separate-but-equal facilities under construction using Hill–Burton money. After the Fourth Circuit Court ruled on the *Simkins* case, Quigley informed the regional offices that no further payments should be made on these projects until the Supreme Court had issued its decision (57).

On 2 March 1964, the Supreme Court denied the issuance of a writ of certiorari, upholding the Fourth Circuit Court of Appeals' ruling against the separate-but-equal provisions in the Hill–Burton program (58). Hospitals that were receiving Hill–Burton funds were forced to integrate. Quigley could now stand on firm ground in his effort to eliminate racism in medicine.

Window of Transition: Hill–Burton and the 1964 Civil Rights Act

The DHEW had anxiously awaited direction on Hill–Burton applications. Immediately after the Supreme Court ruled on the *Simkins* case, DHEW Secretary Anthony Celebrezze called for new regulations consistent with "the intent of the law" (58). This meant that new applications for federal funds would not be approved, except on a totally nondiscriminatory basis. In the case of existing Hill–Burton hospitals, the Secretary would require assurances of nondiscrimination if the hospital sought additional money for expansion or renovation. Celebrezze required that new applicants guarantee nondiscrimination in patient admission and the right of physicians to admit their patients and other staff privileges.

One of the criticisms of the Eisenhower administration's handling of the monumental decision in *Brown v Board of Education of Topeka, Kansas* was the reluctance to play a strong leadership role in executing the new interpretation of the law. The *Simkins v Moses H. Cone Memorial Hospital* was the *Brown* case for hospitals. Assertive action was important if hospital desegregation was to be achieved. Celebrezze and Quigley took the initiative. After receiving approval by the Federal Hospital Council the week after the Supreme Court ruling on the *Simkins* case, the Surgeon General published new regulations for the Hill–Burton program on 9 March 1964. The new regulations (59, 60) provided the following:

> Before a construction application is recommended by the State agency for approval, the State agency shall obtain assurances from the applicant that all portions and services of the entire facility for the construction of which . . . aid under the Federal Act is sought, will be made available without discrimination on account of race, creed, or color; and that no professionally

qualified person will be discriminated against on account of race, creed, or color with respect to the privilege of professional practice in the facility.

However, with respect to applications that had previously been approved and to all completed projects, desegregation could be accomplished only by voluntary change in operating policies or subsequent approval of applications for additional Hill–Burton assistance. The federal government could not force hospitals to integrate if they had already used Hill–Burton funds (59, 60).

In May 1964, Celebrezze testified before the House Committee on Interstate and Foreign Commerce in support of extending the Hill–Burton Act and announced his plan to convene leaders of medical and hospital organizations for the purpose of speeding up the integration of hospitals through voluntary compliance (61). Quigley organized the DHEW Conference on Civil Rights and invited representatives from six national medical and nursing organizations, the Federal Hospital Council, and leadership of DHEW and the Public Health Service.

Addressing conference participants, Celebrezze admitted that DHEW had unfinished business that involved the elimination of discrimination in all aspects of health care. He drew the group's attention to the recently passed 1964 Civil Rights Act and specifically Title VI, which required that "no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance"(61).

As Charles Hite, a field officer for the Hill–Burton program who worked out of the Charlottesville, Virginia, office explained, Title VI of the Civil Rights Act brought many more hospitals under the requirements of civil rights legislation because it affected every health program that was funded by the federal government. Although the Hill–Burton program provided monies to build many hospitals that admitted black and white patients to the same institution, internal segregation continued in these hospitals, with separate rooms, wards, buildings, cafeterias, lavatories, linens, blood banks, and sometimes entrances. Moreover, the federal government could not force a hospital that had already received and spent its Hill–Burton money to change its policies, as stated by the Court of Appeals that ruled on the *Simkins* case (62; Interview with Hite C, 10 February 1989). Civil rights activists in the federal government needed more than rewritten Hill–Burton regulations to achieve any substantial change. Title VI was the leverage they needed because it threatened to withhold all old and new federal funds to institutions that upheld policies of discrimination (62).

Title VI was also the leverage needed by civil rights groups who wanted to lodge complaints against noncompliant hospitals and thereby apply pressure from another direction. Meltsner maintained contact with lawyers from the NAACP Legal Defense and Education Fund throughout the country. He also received information on hospitals, such as the Moses H. Cone Memorial Hospital, that continued to discriminate against black patients, physicians, and employees. On the basis of this information, Meltsner drafted formal complaints against the discriminatory hospitals, most of which were located in the South, and sent them to the DHEW. These complaints charged hospitals with failure to comply with Title VI. As Meltsner explained, this tactic was used to force the DHEW to develop an enforcement strategy for Title VI (63, 64; Interview with Meltsner M, 19 April 1989). Before 1965 ended, Quigley would receive 323 complaints against hospitals, most of which were written by Meltsner. As Quigley reflected (65; Interview with Quigley J, 3 March 1989), all these complaints represented the truth.

Conclusion

Discrimination in health care resulted in the exclusion of black physicians from hospital medical staffs and medical organizations, black patients from hospital care, and black students from medical schools. Three physicians—Louis T. Wright, W. Montague Cobb, and Paul Cornely—saw the integration of hospitals as the best way to improve the health of black persons because they knew that a separate hospital system would never match the quality of health care facilities that were available for white persons. They designed a strategy that combined political action through local NAACP chapters, legal action through the NAACP Legal Defense and Education Fund, education of black physicians, and research to document the health outcomes of black persons cared for in an unequal system. They initiated their campaign just as the federal government launched its largest hospital construction program.

The Hill–Burton program reflected the past and the future. It permitted construction of separate-but-equal hospitals but required that comparable facilities be provided for both races in the same community. This policy permitted states to maintain the social system of segregation and, at the same time, attempted to address the hospital needs of black persons. Although black patients and white patients were hospitalized in the same facility for the first time in some communities, social segregation persisted even in biracial hospitals as patients were put into separate wards or buildings.

Wright, as Chairman of the Board of Directors of the NAACP, created a health committee to direct the activities against discrimination in medicine and required that local NAACP chapters oppose the construction of separate-but-equal hospitals in their own communities. The NAACP Legal Defense and Education Fund pioneered efforts to eliminate discrimination in higher education and then in all public education. The strategy was later applied to hospitals, focusing on similar separate-but-equal language. The first court case involving racial discrimination in ospital care, *Eaton v Board of Managers of the James Walker Memorial Hospital*, did not specifically involve the Hill–Burton program. However, the idea of seeking evidence of discrimination in a hospital receiving federal funds emerged from the judges' dissent.

A turning point in the effort to integrate hospitals came when the Supreme Court ruled in favor of the plaintiffs in the case of *Simkins v Moses H. Cone Memorial Hospital*. Meltsner and Greenberg successfully argued that state action in the Hill–Burton program demanded that the separate-but-equal clause be eliminated and that federal funds be distributed without regard to race, creed, or national origin, as required under the Fifth and Fourteen Amendments. The *Simkins* verdict had a substantial effect not only on executive action in the White House, the DHEW, and the Public Health Service in the implementation of the Hill–Burton program but also on the 1964 Civil Rights Act, Title VI regulations, and the implementation of major federal health programs. Such programs included Medicare, which affected almost every public hospital in the United States. Step by step, persons who advocated the end of discrimination in health care moved closer to their goal, first by obtaining a victory in the courts, then by amassing support from professional organizations, Congress, and the public.

Note: Research for this article won the Milton W. Hamolsky Faculty award from the Society of General Internal Medicine in May 1996 and a 3-year Charles E. Culpeper Foundation award for research in the humanities.

Acknowledgments: The author thanks Drs. John D. Stobo, Edward Holmes, and Gert Brieger for providing dedicated research time and facilities. This article is dedicated to the late Samuel Preston Martin.

Grant Support: In part by grant 13928 (preliminary research, 1988 to 1989) and continued support (1992 to 1996) from the Robert Wood Johnson Foundation.

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In the common, natural course of events physicians, surgeons and apothecaries are faced with enormous demands for sympathy: they may come into immediate contact with half a dozen deeply distressing cases in a single day. Those who are not saints are in danger of running out of funds and becoming bankrupt; a state which deprives them of a great deal of their humanity. If the man is in private practice he is obliged to utter more or less appropriate words to preserve his connexion, his living; and the mere adoption of a compassionate face as you have no doubt observed goes some little way towards producing at least the ghost of pity. But *our* patients [sailors in the British navy] cannot leave us. They have no alternative. We are not required to put on a conciliating expression, for our inhumanity in no way affects our livelihood. We have a monopoly; and I believe that many of us pay a very ugly price for it in the long run. You may have already met a number of callous idle self-important self-indulgent hard-hearted pragmatic brutes wherever the patients have no free choice.

Patrick O'Brian
The Nutmeg of Consolation
New York: W.W. Norton; 1991

Submitted by:
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American Journal of
Preventive Medicine

RESEARCH ARTICLE

A Randomized Trial of Weight Change in a National Home Visiting Program

Debra Haire-Joshu, PhD,[1,2] Cynthia D. Schwarz, MPH, MS, RD,[1] Karen Steger-May, MA,[3] Christy Lapka, RD, MS,[1] Kenneth Schechtman, PhD,[3] Ross C. Brownson, PhD,[4,5] Rachel G. Tabak, PhD, RD[4]

Introduction: Clinical trials have demonstrated significant impact in reducing weight and incidence of type 2 diabetes mellitus. However, the intensity of these trials limits their scalability to real world settings. The purpose of this study was to embed a lifestyle intervention for overweight and obese mothers within the routine practice of a parent education, home visiting organization.

Design: Pragmatic trial that used a stratified random design.

Setting/participants: Overweight or obese mothers of preschool children located across St. Louis, Missouri, enrolled in Parents As Teachers, a home visiting organization reaching women and children nationwide.

Intervention: A lifestyle intervention derived from the Diabetes Prevention Program was embedded within Parents As Teachers entitled Healthy Eating and Active Living Taught at Home (HEALTH).

Main outcome measures: Outcomes included the proportion of women that achieved 5% weight loss at 24 months and improvements in clinical and behavioral outcomes at 12 and 24 months. Participants were enrolled from 2012 to 2014 and data analysis began in 2016.

Results: Women in the usual care versus intervention group were significantly less likely to achieve 5% weight loss at 24 months (11% vs 26%, p=0.01). At 12 months, there was a 2.8-kg difference in weight between groups (p=0.0006), and by 24 months a 4.7-kg difference in weight (3.2 [SD=7.6] kg vs −1.5 [SD=8.3] kg, p=0.002); group differences in waist circumference were also evident by 12 months (2.1 [SD=8.4] cm vs −0.7 [SD=9.8] cm, p=0.04) and 24 months (3.8 [SD=10.6] cm vs −2.5 [SD=9.1] cm, p=0.005), as were improvements in behavioral outcomes. There was no difference in blood pressure between groups.

Conclusions: HEALTH achieved modest but clinically significant weight loss outcomes, and reduced weight gain in mothers of young children. The scalability of this embedded intervention offers the potential to reach mothers in Parents As Teachers programs nationally.

Trial registration: This study is registered at www.clinicaltrials.gov NCT01567033.

Am J Prev Med 2018;54(3):341–351. *© 2018 American Journal of Preventive Medicine. Published by Elsevier Inc. All rights reserved.*

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0749-3797/$36.00
https://doi.org/10.1016/j.amepre.2017.12.012

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INTRODUCTION

Diabetes is a major public health problem of the 21st century.[1] Several successful large-scale clinical trials have clearly demonstrated the significant impact of intensive lifestyle interventions in reducing weight and incidence of type 2 diabetes mellitus from 29% to 58%.[2–4] However, the intensity and expense of these clinical trials limits applicability in real world settings. Lifestyle interventions have been translated across a variety of primary care and community health settings, such as the YMCA,[5] as well as non–health focused settings including churches and worksites.[6,7] Public health priorities continue to call for transfer and scale-up of efficacious lifestyle interventions that are sustainable to reach populations at risk.[8]

Higher rates of obesity are reported for women than men.[9,10] Maternal weight gain, initiated and repeated across pregnancies and maintained after childbirth, impacts lifelong risk for obesity and development of type 2 diabetes in reproductive age and postmenopausal women.[11,12] Mothers of young children face multiple competing demands that limit their ability to participate or benefit from lifestyle interventions, further increasing risk for weight-related comorbid conditions. Sleep deprivation and fatigue, lack of child care, and competing roles and responsibilities are major deterrents to women engaging in healthy lifestyle behaviors necessary to achieve ideal body weight.[13] These same barriers are associated with decreased activity and increased intake of convenience or away foods, resulting in additional caloric intake and weight gain.[14,15] Women also serve as role models and important influencers on the learned lifestyle behaviors of their children and families.[16,17]

One approach for addressing barriers to obesity prevention and treatment lies in partnerships with home visiting organizations that already reach women at home as part of their mission. Pragmatic interventions embedded in home visiting organizations can enhance accessibility to lifestyle interventions and allow for ongoing contact and support for behavior change. This also offers the opportunity to scale up effective interventions to maximize public health impact in preventing type 2 diabetes.[18] The translational challenge lies in integrating lifestyle interventions within the mission, standards, and funding requirements of home visiting organizations that may not prioritize health-related content.

Parents As Teachers (PAT) is a national home visiting organization whose mission is to empower parents as their child's most influential teacher, promoting positive child development and school readiness.[19] PAT offers an evidence-based curriculum delivered by parent educators free of charge to families until the youngest child enters school, allowing for ongoing support and contact.[19] The program is supported through federal and state funds. As of 2016, PAT was located in all 50 states reaching 123,468 parents and 148,659 children nationally.[19] PAT offers an excellent organizational system for delivering, sustaining, and scaling-up interventions derived from the Diabetes Prevention Program (DPP) for obese or overweight mothers of young children.

Prior work with PAT effectively tested dietary interventions targeted to African American parents of infants,[20] rural parents of young children,[21] and teen mothers.[22] This study tests the impact of Healthy Eating & Active Living Taught at Home (HEALTH),[23] a lifestyle intervention derived from DPP, embedded within the usual PAT curriculum, and targeting overweight and obese mothers of preschool children at risk for excess weight. It is hypothesized that when compared with usual care, participants in the HEALTH intervention group are significantly more likely to achieve and maintain a 5% weight loss at 24 months and show improvements at 12 and 24 months in waist circumference, blood pressure, and behavioral outcomes defined by eating patterns and physical activity.

METHODS

Study Sample

This pragmatic trial used a stratified random design implemented with PAT affiliated programs located across eight St. Louis, Missouri regions. Inclusion criteria included female participants, aged between 18 and 45 years, overweight or obese (BMI 25–45), having at least one preschool-aged child at risk for overweight (BMI percentile≥60%)[24] living in the home, plans to continue in the PAT program for >2 years, and able to give informed consent. Exclusion criteria included women who were currently pregnant or planned to become pregnant in the next 24 months, unable to speak English, current enrollment in a weight-loss program, undergoing treatment for diabetes or eating disorders, or inability to engage in a walking program. PAT rolling recruitment of parents was conducted through informational events, provider referrals, and child care organizations. Participants were enrolled from 2012 to 2014, the intervention concluded in 2016, and data analysis began. Study staff called interested mothers to establish eligibility; baseline assessements were completed in a clinical setting where consent was also obtained. Participants were randomized to treatment condition by study staff using randomization sequences generated a priori by the study statistician using a formal probability model with a 1:1 allocation ratio and random block size. Randomization sequences were stratified by region. Sample size was calculated from pilot data assuming a 5% weight loss from baseline, using a two-sided test (α=0.05) with a power of 0.9. Data were collected at baseline, 12 months, and 24 months at the study clinic site. Participants received $50 gift cards for completing data collection at each time frame. The IRB of Washington University in St. Louis approved this study.

Participants in usual care received the standard PAT program for parents of preschoolers, who can be eligible for up to 25 hour-long visits but receive an average of 10 visits per year.[19] Parent educators provide support for parents while delivering a curriculum designed to ensure school readiness through promotion of parent–child communication, child development, and family well-being. The curriculum also includes information on general health principles (e.g., accident prevention) but does not address maternal or family obesity-related lifestyle change.

Intervention participants received HEALTH, which embedded a lifestyle intervention derived from DPP within the standard PAT curriculum. Participants were entitled to receive up to 36 visits over 24 months; however, the actual number of visits was based on need. Formative research with PAT staff ensured lifestyle content was consistent with organizational mission, practice, and funding requirements. These factors were important to address to ensure the sustainability and scalability of the embedded intervention.[25] Intervention content was simplified to address specific lifestyle behaviors most likely to impact calorie intake, including limiting intake of sugar-sweetened beverages, substituting fruits and vegetables for high caloric snacks, limiting portion sizes, increasing physical activity by walking 30 minutes per day, and decreasing sedentary activity, such as TV viewing. PAT parent–child activities were incorporated into HEALTH content (Appendix Table 1, available online). Social Cognitive Theory guided the adaptation of behavior change content to address intrapersonal (e.g., self-assessment, reinforcement); interpersonal (e.g., observational learning/parental modeling); and home environments (e.g., number of TVs, food access).[26,27] This approach ensured HEALTH met PAT requirements for reimbursement.

To implement the intervention, parent educators were recruited from target communities (N=9, mean age 44 years [range, 29 to 67], 67% have a college degree) with PAT experience and certified on the usual care curriculum. Parent educators then received additional training on the intervention related to (1) background and rationale; (2) lifestyle change content for weight loss; (3) the importance of parental lifestyle and modeling on child weight and development; (4) overview of the intervention protocol; (5) role-play practice sessions with other parent educators; and (6) feedback from trainers. Trainings took place in person over 1 day (8 hours), consistent with the usual PAT training protocols.

Consistent with routine PAT practice, parent educators delivered the intervention that was randomly assigned to the participant. To ensure that each protocol was appropriately delivered and that there was no risk of contamination across groups, parent educators completed lesson plan checklists documenting delivery of content and audiotaped home visits. Expert study staff then reviewed the checklists and audiotapes to ensure that content was delivered appropriately by the parent educator per group assignment. Study staff also randomly observed two home visits a year for each parent educator, an approach consistent with PAT standards of practice.

Measures

Participants completed questionnaires and anthropometric assessments in a clinical setting. Participants' height; weight (primary outcome); and waist circumference (secondary outcome) measurements were obtained in accordance with procedures used by the National Health and Nutrition Examination Survey.[28] Blood pressure (secondary outcome) was measured in accordance with American Heart Association guidelines.[29,30]

Behavioral assessment included dietary change as measured by the National Health and Nutrition Examination Survey Dietary Screener Questionnaire (caloric intake was a secondary outcome), which asked parents to recall frequency of intake of foods and drinks over the prior month.[23] To assess physical activity, the International Physical Activity Questionnaire (moderate-intensity walking was a secondary outcome)—a seven-item activity module that measures sedentary behavior and general type, frequency, duration, and intensity of physical activity—category scores (low, moderate, or high intensity) were used.[31] Sociodemographic measures included variables such as age, marital status, number of children, and monthly income.

Statistical Analysis

Baseline characteristics were compared for participants who did and did not provide data after baseline by unpaired *t*-test (for normally distributed continuous variables); Wilcoxon's test (for ordinal variables); or chi-square test (for binary variables). For participants included in the primary analysis (i.e., participants that provided data after baseline), these methods were also used to compare treatment groups at baseline.

Chi-square tests were used to compare the proportion of participants in each group that achieved >5% weight loss at 12 and 24 months. For continuous outcomes, repeated measures mixed model ANOVA (RM-ANOVA) with an autoregressive covariance structure was used to test hypotheses regarding the equality of changes between baseline and 24 months in the two treatment groups. The RM-ANOVA included the main effects for, and interaction of, treatment group and timepoint. Statistical contrasts within the RM-ANOVA were used to test the null hypothesis that changes between two specific timepoints in the usual care group were equal to corresponding changes in the intervention group. Because the primary hypothesis concerns group differences in change between baseline and 12 months, the *p*-value for this contrast was not adjusted for multiple comparisons. For outcomes that are not continuous, analogous analyses were performed using generalized estimating equations, where ordinal outcomes were modeled with a multinomial probability distribution, cumulative logit link function, and independent correlation structure, and binary outcomes were modeled with a binomial distribution, logit link function, and exchangeable correlation structure.

Ancillary RM-ANOVA analyses were performed to determine if the effect of the intervention on change in weight differs across levels of obesity (overweight versus obese I versus obese II/III); race (white versus other); income (<$30,000 versus $30,000–$74,999 versus ≥$75,000); or number of personal visit sessions completed (tertiary split of <13 versus 13–20 versus ≥21). The focus of each of these models was the interaction between treatment group, timepoint, and each potential moderator variable.

In the text, mean changes and SDs are expressed relative to baseline. Probability values <0.05 were considered significant. Means at each time point are presented in the table, whereas change scores are presented in the text.

RESULTS

As noted in the consort diagram (Figure 1), of the 230 participants who completed the baseline assessment, 179

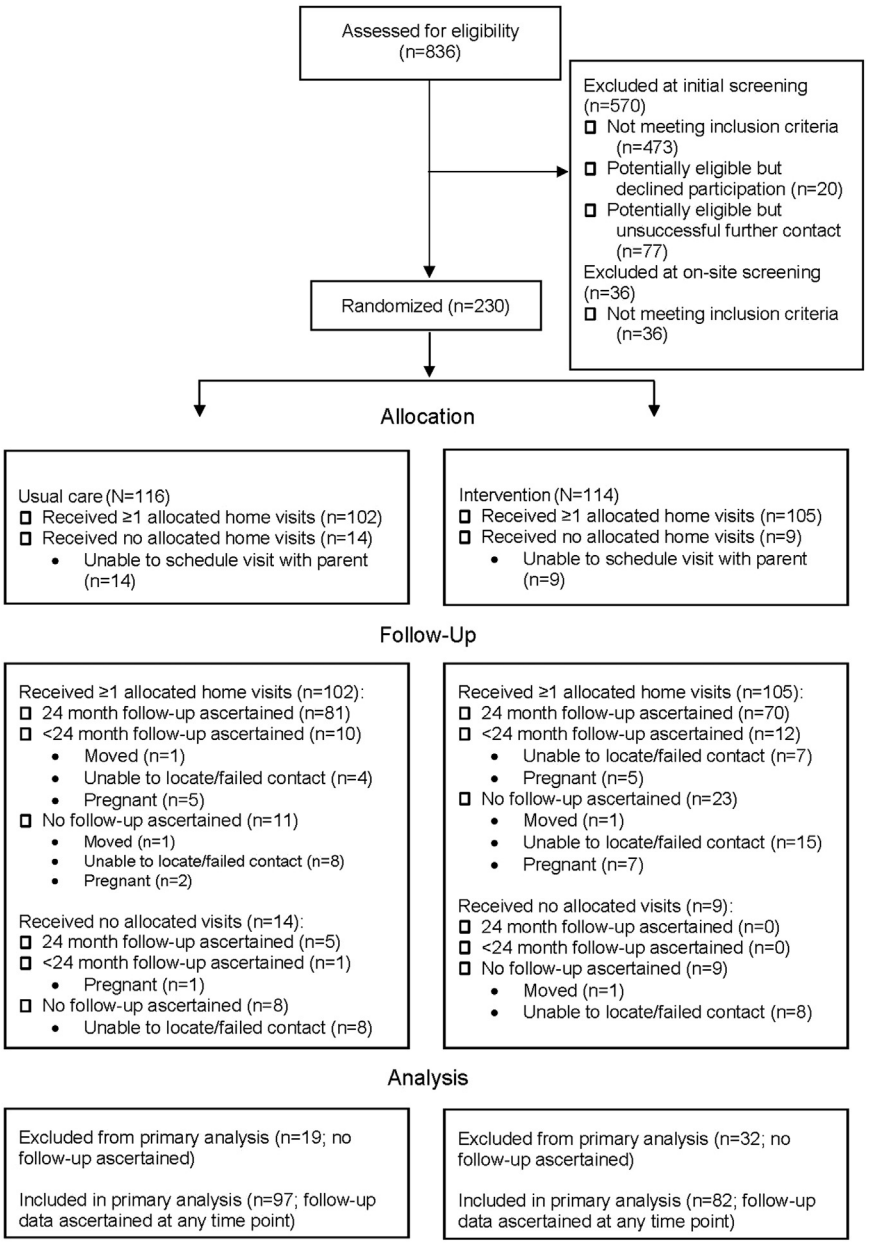


Figure 1. CONSORT diagram.

(78%) participants completed a post-test or follow-up assessment. At 12 months, 173 (75%) of participants completed a post-test; at 24 months 156 (68%) completed a follow-up. Reasons for noncompletion of participants at 24 months included 9% of women who were withdrawn because of pregnancy, and 23% who moved or could not be located. There was no significant difference in participation between groups by BMI or obesity category. There were significant differences by treatment group (p=0.03); income (p=0.0006); and race (p=0.01).

Mean age of participants was 32 (SD=6) years. The majority of the sample was currently married (61%), ethnically diverse (32% African American or black, 7% other) and economically diverse (51% receiving Women, Infants, and Children Program benefits). The majority of participants (63%) met criteria for class I or class II obesity; the remaining sample was evenly divided between overweight (20%) and class III obesity (18%). As noted in Table 1, the intervention participants were generally less educated than usual care ($p<0.05$). There were no significant differences between usual care and intervention participants regarding baseline weight, waist circumference, blood pressure, diet, activity, or other demographic variables.

Table 1. Baseline Characteristics for Enrolled Participants Who Provided Follow-up Data at Any Time Point

Maternal focused variables	Total cohort (*n*=179)	By treatment group		
		Usual care (*n*=97)	Intervention (*n*=82)	*p*-value
Age, years, M (SD)	32 (6)	33 (5)	32 (6)	0.91[a]
Race, *n* (%)				
Black or African American	57 (32)	30 (31)	27 (33)	n/a
White	105 (59)	59 (61)	46 (56)	
Other	13 (7)	8 (8)	5 (6)	
Unknown, not reporting race	4 (2)	0 (0)	4 (5)	
Highest grade of school completed, *n* (%)				
Some high school, high school graduate	25 (14)	10 (10)	15 (19)	**0.05**[b]
Some college/technical/vocational school	65 (37)	33 (34)	32 (40)	
College or university graduate	56 (31)	34 (35)	22 (27)	
Graduate or professional school	32 (18)	20 (21)	12 (15)	
Presently married, *n* (%)	109 (61)	59 (61)	50 (61)	0.98[c]
Annual household income from all sources, *n* (%)				
<$30,000	66 (39)	36 (38)	30 (40)	0.65[b]
$30,000–$74,999	62 (36)	34 (36)	28 (37)	
≥$75,000	42 (25)	25 (26)	17 (23)	
WIC or other program assistance, *n* (%)	89 (51)	43 (46)	46 (58)	0.14[c]
Weight, kg, M (SD)	93 (15)	93 (15)	93 (16)	0.84[a]
BMI, M (SD)	34.4 (5.2)	34.5 (5.2)	34.4 (5.3)	0.91[a]
Obesity category, *n* (%)				
Overweight	35 (20)	19 (20)	16 (20)	0.97[b]
Obese I	68 (38)	35 (36)	33 (40)	
Obese II	44 (25)	28 (29)	16 (20)	
Obese III	32 (18)	15 (15)	17 (21)	
Waist circumference, cm, M (SD)	110.8 (12.5)	111.1 (12.3)	110.5 (12.9)	0.72[a]
Systolic blood pressure, mmHg, M (SD)	120 (11)	120 (11)	121 (12)	0.58[a]
Diastolic blood pressure, mmHg, M (SD)	77 (8)	77 (8)	76 (9)	0.57[a]
Dietary Screener Questionnaire, daily intake in past month, median (IQR)				
Added sugars from food, tsp	12.9 (8.9)	13.0 (9.5)	12.6 (9.1)	0.89[d]
Added sugars from sugar-sweetened beverages, tsp	4.1 (9.3)	3.9 (9.2)	4.3 (9.3)	0.97[d]
Fruit/vegetable/legume, cup equivalent	2.3 (1.3)	2.3 (1.1)	2.5 (1.4)	0.98[d]
Fruit/vegetable/legume minus french fries, cup equivalent	2.3 (1.3)	2.3 (1.2)	2.3 (1.3)	0.89[d]
IPAQ				
Time spent sitting on a weekday, hour, median (IQR)	5.0 (5.0)	5.0 (5.0)	6.0 (4.3)	0.13[b]
Physical activity category, *n* (%)				
Low	42 (29)	22 (28)	20 (30)	
Moderate	58 (40)	27 (34)	31 (46)	
High	46 (32)	30 (38)	16 (24)	0.21[b]

Note: Boldface indicates statistical significance ($p < .05$). Because of missing data, sample sizes may vary across variables. DSQ recommendations: For fruits and vegetables, and added sugars from sugar-sweetened beverages use the square-root transformation; for added sugars from food, use the cube-root transformation.

[a]*p*-value compares treatment groups by unpaired *t*-test.

[b]*p*-value compares treatment groups by Wilcoxon's test. Ordinal categorical data (i.e., education, income, obesity category, physical activity category) were assigned numbered values in increasing order of magnitude prior to analysis.

[c]*p*-value compares treatment groups by χ^2 test.

[d]*p*-value compares treatment groups by unpaired *t*-test using transformed data per IQR, defined as the 75th minus the 25th percentile.

DSQ, Dietary Screener Questionnaire; IPAQ, International Physical Activity Questionnaire; IQR, interquartile range; n/a, not applicable; WIC, Women, Infants, and Children Program benefits.

Intervention participants completed significantly more home visits than usual care (23 [SD=9] vs 13 [SD=6] visits, $p<0.0001$); the average length of visits did not differ (63 minutes [SD=11] vs 63 minutes [SD=11], $p=0.17$). A parent post survey asked participants to rate home visits from poor to excellent (1 to 5). The majority

Table 2. Outcomes at Baseline, 12, and 24 Months

Outcome measures	Baseline	12-month	24-month
Weight, kg, M (SD)			
Usual care	93.0 (15.3)	95.3 (16.0)	97.2 (16.5)
Intervention	92.6 (15.9)	91.5 (16.9)	91.3 (16.8)
p-value BL-12M[a]		**p=0.0006**	
p-value BL-24M[a]			**p_{Sidak}=0.002**
p-value 12M-24M[a]			p_{Sidak}=0.35
BMI, M (SD)			
Usual care	34.5 (5.3)	35.4 (5.7)	36.0 (5.9)
Intervention	34.4 (5.3)	34.1 (5.9)	33.9 (5.6)
p-value BL-12M[a]		**p=0.002**	
p-value BL-24M[a]			**p_{Sidak}=0.0008**
p-value 12M-24M[a]			p_{Sidak}=0.12
Waist circumference, cm, M (SD)			
Usual care	111.1 (12.4)	113.1 (11.9)	115.3 (13.1)
Intervention	110.5 (12.9)	109.6 (13.5)	108.5 (13.9)
p-value BL-12M[a]		**p=0.04**	
p-value BL-24M[a]			**p_{Sidak}=0.005**
p-value 12M-24M[a]			p_{Sidak}=0.11
Systolic blood pressure, mmHg, M (SD)[b]			
Usual care	120 (11)	120 (12)	122 (11)
Intervention	121 (12)	119 (10)	120 (12)
p-value BL-12M[a]		p=0.08	
p-value BL-24M[a]			p_{Sidak}=0.31
p-value 12M-24M[a]			p_{Sidak}=0.99
Diastolic blood pressure, mmHg, M (SD)[b]			
Usual care	77 (8)	79 (9)	79 (9)
Intervention	76 (9)	76 (9)	78 (9)
p-value BL-12M[a]		p=0.17	
p-value BL-24M[a]			p_{Sidak}=0.92
p-value 12M-24M[a]			p_{Sidak}=0.60
Added sugars from sugar-sweetened beverages, tsp, M (SD)[b]			
Usual care	8.5 (11.2)	8.1 (12.7)	6.6 (8.3)
Intervention	8.1 (11.0)	3.9 (3.5)	5.1 (14.6)
p-value BL-12M[a]		**p=0.04**	
p-value BL-24M[a]			**p_{Sidak}=0.03**
p-value 12M-24M[a]			p_{Sidak}=0.52
Added sugars from food, tsp, M (SD)[b]			
Usual care	15.3 (9.6)	14.1 (9.8)	13.0 (7.8)
Intervention	14.9 (9.3)	10.5 (4.7)	10.8 (11.3)
p-value BL-12M[a]		**p=0.03**	
p-value BL-24M[a]			**p_{Sidak}=0.01**
p-value 12M-24M[a]			p_{Sidak}=0.33
Food/vegetable/legume, cup equivalent, M (SD)[c]			
Usual care	2.6 (1.2)	2.8 (1.5)	2.6 (1.1)
Intervention	2.6 (1.1)	2.5 (1.1)	2.5 (0.9)
p-value BL-12M[a]		p=0.27	
p-value BL-24M[a]			p_{Sidak}=0.93
p-value 12M-24M[a]			p_{Sidak}=0.76
Time spent sitting on a weekday, hour, M (SD) [b]			
Usual care	5.3 (2.9)	5.9 (3.4)	5.2 (3.0)

(continued on next page)

Table 2. Outcomes at Baseline, 12, and 24 Months *(continued)*

Outcome measures	Baseline	12-month	24-month
Intervention	6.3 (3.3)	4.8 (2.9)	5.1 (3.0)
p-value BL-12M[a]		**p=0.0001**	
p-value BL-24M[a]			p_{Sidak}=0.09
p-value 12M-24M[a]			p_{Sidak}=0.35
Physical activity category, *n* (%)			
Low			
Usual care	22 (31)	15 (22)	17 (28)
Intervention	20 (33)	12 (22)	6 (11)
Moderate			
Usual care	22 (31)	25 (36)	24 (39)
Intervention	30 (50)	21 (39)	20 (36)
High			
Usual care	28 (39)	29 (42)	20 (33)
Intervention	10 (17)	21 (39)	30 (54)
p-value BL-12M[d]		p=0.20	
p-value BL-24M[d]			**p_{Sidak}=0.0004**
p-value 12M-24M[d]			**p_{Sidak}=0.03**

Note: Boldface indicates statistical significance ($p < .05$). Usual care group n=97, intervention group n=82.
[a]*p*-value compares treatment groups on change between the specified time points using a statistical contrast within RM-ANOVA. *p*-values labeled p_{Sidak} are Sidak-adjusted for multiple comparisons.
[b]Data are rank-transformed prior to analysis.
[c]Data are square-root transformed prior to analysis.
[d]*p*-value compares treatment groups on change between the specified time points using a statistical contrast within GEE.
12M, 12 months; 24M, 24 months; BL, baseline; GEE, generalized estimating equation; RM, repeated measures.

of participants from both groups rated visits as very good or excellent (intervention=90%, usual care= 84%). Data from lesson plan checklists revealed delivery of 87% of objectives for intervention visits and 97% for usual care visits. Study staff review of taped visits and observation visits verified content completion as reported, and found no contamination in delivery across groups.

Intervention outcomes are presented in Table 2. There was no difference between groups in achieving 5% weight loss at 12 months (usual care=10% vs intervention=18%, p=0.13 by chi-square); however, at 24 months, the intervention group was significantly more likely to achieve 5% weight loss compared to baseline (usual care=11% vs intervention=26%, p=0.01 by chi-square).

At 12 months, the intervention participants lost 0.7 (SD=6.2) kg, whereas the usual care participants gained 2.1 (SD=4.8) kg, overall a 2.8-kg difference (p=0.0006). By 24 months, there was a 4.7-kg difference between groups, as usual care participants continued to gain weight as compared with baseline while intervention participants sustained their weight loss (3.2 [SD=7.6] kg vs –1.5 [SD=8.3] kg, p=0.002). Compared with baseline, this represents a 2.3% and 3.5% increase in usual care weight at 12 and 24 months, respectively; by contrast, the intervention group had a 12- and 24-month weight reduction of –0.8% and –1.5%. Weight differences were also reflected in BMI change from baseline between usual care and intervention groups at both 12 months (0.8 [SD=1.8] vs –0.1 [SD=2.4], p=0.002) and 24 months (1.3 [SD=2.9] vs –0.5 [SD=3.1], p=0.0008) with the following percent difference from baseline at 12 months (2.3% vs –0.5%) and at 24 months (3.8% vs –1.4%).

Compared with baseline, 81% of usual care participants either maintained or decreased obesity category at 12 months compared with 91% of intervention participants;

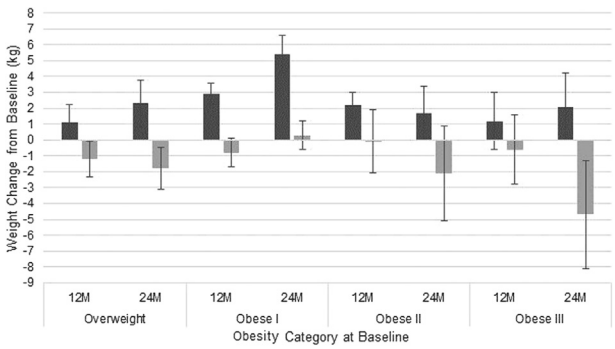


Figure 2. Mean weight change from baseline with SE bars by obesity category for each treatment group.
Note: Black bars = usual care; gray bars = intervention. www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html.

by 24 months, 67% of usual care compared with 87% of intervention participants maintained or decreased obesity category. A review of obesity categories depicted in Figure 2 reveals that most of the weight gain occurred among participants by 24 months in the usual care, obese I category, whereas 24-month weight loss was most likely to occur among intervention participants in the obese III category.

Differences in waist circumference from baseline in usual care and intervention groups were evident by 12 months (2.1 cm [SD=8.4] vs –0.7 cm [SD=9.8], p=0.04) and more pronounced at 24 months (3.8 cm [SD=10.6] vs –2.5 cm [SD=9.1], p=0.005). There was no significant difference in change in systolic or diastolic blood pressure between groups.

There was a significant reduction in sugar through beverage intake from baseline to 12 months between usual care and intervention groups (–1.1 [SD=13.3] vs –4.2 [SD=10.8] teaspoons of sugar, p=0.04), which was maintained at 24 months (–1.9 [SD=10.1] vs –2.7 [SD=17.9] teaspoons of sugar, p=0.03). There was also a significant reduction in intake of sugar from food between usual care and intervention groups by 12 months as compared with baseline (–1.6 [SD 8.7] vs –4.4 [SD 9.2] teaspoons of sugar, p=0.03), which was maintained at 24 months (–1.9 [SD=8.8] vs –3.7 [SD=13.8] teaspoons of sugar, p=0.01). There were no significant differences in change between the treatment groups for the other measured dietary variables.

From baseline to 12 months, the intervention group significantly reduced their sedentary activity when compared with usual care (–1.6 hours [SD=3.2] vs 0.9 hours [SD=3.0], p=0.0001), a behavior that was not maintained at 24 months. However, a significantly larger percentage of the intervention group moved from low or moderate to high physical activity from baseline to 24 months (p=0.0004), with a majority of the change occurring between 12 and 24 months (usual care 42% to 33% vs intervention 39% to 54% high activity at 12 and 24 months, respectively, p=0.03).

Ancillary analyses revealed that obesity category (p=0.11); race (p=0.62); income category (p=0.11); and categorized number of home visits completed (p=0.12) did not significantly moderate intervention effects on change in weight.

A sensitivity analysis was performed for the primary outcomes that achieved significance in the initial analysis. This included 51 participants who did not provide data after baseline, yielding a total sample of 230 for the sensitivity analysis. Review of the resultant p-values from this analysis found no substantive changes to the conclusions reported.

DISCUSSION

These findings inform several key areas of translational research. First, these results suggest an intervention that is low intensity, because it is embedded within the real-world practice of a parent education home visiting organization, can achieve clinically significant weight outcomes among overweight or obese women by 24 months. More than one quarter of intervention participants (26%) successfully achieved 5% weight reduction at 24 months, up from 18% at 12 months, and a 15% improvement over usual care. These results are generally consistent with those reported by other translational studies at 12 months or less.[6,32] The proportion of successful participants is also consistent with the range of 20%–64% reported in a review of translational studies by Aziz and colleagues.[6]

Other weight change indicators also suggest that the intervention achieved clinically relevant improvements over time. At 12 and 24 months, intervention participants reduced weight (by 0.7 kg and 1.5 kg); BMI (by 0.5% and 1.4%); and waist circumference (by 0.3 cm and 1.0 cm). These modest results are less than the mean weight reductions of 1.8 kg[33] to 2.3 kg[18] reported at 12 months by translational studies conducted in clinical and related settings. However, according to the U.S. DPP, each kilogram of mean weight loss is associated with a 16% reduction in diabetes incidence,[2] whereas a 1% reduction in BMI is estimated to avoid 2 million cases of diabetes annually in the U.S.[34] This suggests the intervention had a clinically meaningful impact on diabetes risk at 24 months. A reduction in waist circumference, such as the one achieved by the HEALTH intervention, is also associated with improvements in cardiovascular outcomes.[35]

Second, and of particular interest, is that the HEALTH intervention prevented weight gain between treatment groups at both 12 and 24 months. In the U.S. population, the average weight gain is 0.5 to 1 kg per year, a rather modest accumulation of weight that can lead to obesity overtime.[36,37] The U.S. Agency for Health Care Research and Quality reports that a 1-kg increase in weight per year leads to diabetes, heart disease, and other chronic disease.[38] In this trial, from baseline, usual care participants gained an average of 2.1 kg by 12 months, and 3.2 kg by 24 months. They also showed weight gain across all four obesity categories (overweight to obese III), with the highest gain at both 12 months and 24 months in the obesity I category. This is in contrast to intervention participants who had a consistent, but small, amount of weight loss across all obesity categories. The added value of this intervention may be in the prevention of excess weight gain and delay of comorbid conditions.[37]

These results indicate this intervention, embedded within a real world organization, had a prolonged action phase for behavior change, requiring a longer assessment period to effectively capture clinically significant impact.

This is in contrast to standalone, time-intensive interventions typically delivered over 3 to 6 months and reporting larger magnitudes of behavior change and weight loss,[6] but often associated with diminished effect and weight regain over time.[37] HEALTH was designed to be a scalable intervention, embedded within an organization whose funding is primarily dependent on parenting and child development content and outcomes, not on obesity- or diabetes-related outcomes. This meant content derived from DPP was not the priority of each visit, but rather integrated within standard PAT home visiting curricula, reinforced by parent educators through multiple visits delivered over time. The result of this limited content combined with the long-term delivery approach was incremental change in specific eating and physical activity behaviors, yielding weight-related outcomes over time. For example, with regard to physical activity, intervention participants reduced sedentary activity at 12 months (e.g., reduced TV watching), and subsequently increased physical activity between 12 and 24 months. This embedded approach supports a lifestyle intervention that can be sustained programmatically and delivered to women over several years, providing reinforcement for simple, small changes that can be incorporated into a woman's everyday life, impacting weight and preventing weight gain over time.

Third, embedding the HEALTH intervention within PAT provided a way for women with young children to engage in lifestyle interventions by addressing barriers associated with time and child care, which impact participation and retention. Reviews of translational studies across multiple settings reported that greater weight loss is associated with the number and frequency of sessions attended by participants.[32] In this study, the intervention group engaged in more home visits overall than the usual care group, whose participation rates reflected those reported by PAT in general. The integration of HEALTH content may have required parent educators to spend more time across multiple visits to cover all topics.[19] However, the high satisfaction rates for both intervention and usual care conditions suggests that women were willing to participate in the additional home visits needed to deliver HEALTH content, and indicates the value of interventions designed to address barriers to participation. In addition, this study reported 25% attrition at 12 months and 32% attrition at 24 months, rates comparable or better than those reported by diabetes and clinic-based translational studies.[39]

Limitations

Strengths of this study include the pragmatic trial that used a stratified random design that provides outcome data on a large group of mothers and children. Generalizability may be limited to broader populations because of the geographic focus on St. Louis, Missouri. Other limitations of this study include the use of self-report measures, such as food frequency questionnaires that may yield error in outcome estimates or result in bias. However, appropriate steps were taken to ensure the relevance and psychometric quality of the measures. Finally, the outcome analyses excluded participants that did not provide data after baseline, which might introduce bias in the results if the failure to provide post-baseline data was not completely at random. An assessment of potential bias compared participants included versus excluded from the analysis and no difference was found for BMI or obesity category, and the balance in baseline characteristics between treatment groups (as intended by randomization) was preserved for participants who were included in the analysis.

CONCLUSIONS

Clinically significant weight reduction in women with young children can be achieved through interventions embedded within real-world settings that already reach the target population. The HEALTH intervention achieved modest but clinically significant outcomes in reducing weight, and showed promise in the prevention of weight gain in this high-risk group of women. It showed the value of content derived from DPP delivered incrementally, and reinforced over time by parent educators in the home, and the need for delayed or longer post-assessments to adequately capture cumulative intervention impact. HEALTH was developed in partnership with PAT leadership and parent educators to be consistent with organizational mission and practice, which ensured intervention sustainability as a reimbursable component of usual care delivery. To support population health improvement, scale-up efforts for programs, such as HEALTH, are needed to expand the impact of evidence-based interventions, benefit more people, and foster policy and program change on a lasting basis.

ACKNOWLEDGMENTS

The authors would like to acknowledge the substantive contributions of The Parents as Teachers National Center and the parent educators who worked on this project. This project was funded by the National Institute of Diabetes and Digestive and Kidney Diseases of NIH (grant no. R18DK089461). This study was also supported in part by The National Institute of Diabetes and Digestive and Kidney Diseases Center for Diabetes Translation Research (P30DK092950). The content is solely the responsibility of the authors and does not necessarily represent the official view of NIH. The funding sources had no involvement

in the conduct of the research and preparation of the article. DHJ, CDS, KS, and RCB contributed to the original study conception and to the study design. DHJ, CDS, CL, and RGT contributed to data anquisition and interpretation. KSM conducted the statistical analyses. All authors wrote or revised the manuscript and have read and agreed to the final version. DHJ is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Trails Registration: ClinicalTrials.gov Identifier NCT01567033. https://clinicaltrials.gov/show/NCT01567033.

Parts of this study were presented at the 76th Scientific Sessions of the American Diabetes Association, New Orleans, Louisiana, June 10–14, 2016.

No financial disclosures were reported by the authors of this paper.

SUPPLEMENTAL MATERIAL

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.amepre.2017.12.012.

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Original Article
CLINICAL TRIALS AND INVESTIGATIONS

Obesity

Randomized Controlled Trial of Home-Based Lifestyle Therapy on Postpartum Weight in Underserved Women with Overweight or Obesity

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Objective: This study aimed to assess the efficacy of a home-based lifestyle intervention delivered through Parents as Teachers (PAT), a national home-visiting organization, designed to minimize excessive weight gain through 12 months post partum in socioeconomically disadvantaged (SED) African American women with overweight or obesity.

Methods: This randomized controlled trial was conducted at a single center as part of the Lifestyle Interventions for Expectant Moms (LIFE-Moms) consortium. Analysis was conducted with 185 SED African American women (BMI 25.0-45.0 kg/m^2 at pregnancy onset) retained from an original sample of 267 randomized to standard PAT or PAT+Lifestyle, which embedded lifestyle therapy within standard PAT delivered prenatally and for 12 months post partum.

Results: Compared with standard PAT, the PAT+Lifestyle group gained less weight (2.5 kg vs. 5.7 kg; $P = 0.01$) and were more likely to return to their baseline weight (38.0% vs. 21.5%; $P = 0.01$) from baseline to 12 months post partum. There were no differences between groups in cardiometabolic outcomes, indices of glycemic control and insulin sensitivity, and plasma lipid profile. The estimated cost of PAT+Lifestyle was $81 more to deliver per family than standard PAT.

Conclusions: PAT+Lifestyle decreases weight gain during pregnancy through 12 months post partum in SED African American women with overweight or obesity at the start of pregnancy with minimal additional cost.

Obesity (2019) **27**, 535-541. doi:10.1002/oby.22413

Introduction

The prevalence of overweight and obesity is high among African American women, particularly those who are underserved and socioeconomically disadvantaged (SED) (1-4). Women with obesity are at an increased risk of excessive gestational weight gain (GWG) during pregnancy and have greater weight retention 1 year after delivery, thereby increasing the severity of their obesity and the risk of obesity-related medical comorbidities (4-6). Although lifestyle intervention is recommended for pregnant women with obesity to prevent excessive GWG and postpartum weight retention (7), providing effective real-world therapy in SED women is difficult because of the many barriers to program participation related to parenting responsibilities, costs, limited transportation, and other stressors (8-10).

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Funding agencies: This study was supported by the National Institutes of Health grants DK94416, DK56341 (Nutrition Obesity Research Center), DK092950 (Center for Diabetes Translation Research), DK20579 (Diabetes Research Center), and RR024992 (Clinical and Translational Science Award). Lifestyle Interventions for Expectant Moms (LIFE-Moms) is supported by the National Institutes of Health through the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK, U01 DK094418, U01 DK094463, U01 DK094416, 5U01 DK094466 [Research Coordinating Unit]), the National Heart, Lung, and Blood Institute (NHLBI, U01 HL114344, U01 HL114377), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD, U01 HD072834), the National Center for Complementary and Integrative Health (NCCIH), the NIH Office of Research on Women's Health (ORWH), the Office of Behavioral and Social Sciences Research (OBSSR), the Indian Health Service, and the Intramural Research Program of the NIDDK. We thank the LIFE-Moms consortium members for their contributions to the development and oversight of the common measures and procedures shared across the trials.

Disclosure: The authors declared no conflict of interest.

Author contributions: DHJ, SK, AGC, WTC, RIS, AM, KM: study concept and design. DHJ, AGC, WTC, CDS, RIS, AM, SK, KM: data collection. DHJ, SK, KBS, CLW: analysis and interpretation of data. DHJ, SK, WTC, RIS, CLW, AM, AGC, KM: drafting of manuscript. DHJ, SK, WTC, CDS, RIS, CLW, AM, AGC, KM: critical revision of the manuscript. DHJ, SK, AGC: obtain funding.

Clinical trial registration: ClinicalTrials.gov identifier NCT01768793.

Received: 20 July 2018; **Accepted:** 21 November 2018; **Published online 22 March 2019. doi:10.1002/oby.22413**

Partnerships with organizations trusted by women in the community offer an infrastructure for overcoming challenges associated with reaching young mothers, particularly those who are SED (8,11-14). Parents As Teachers (PAT) is a national home-visiting organization whose mission is to empower parents as their child's most influential teacher. PAT trains parent educators to deliver an evidence-based curriculum through home visits. PAT visits are generally reimbursed via federal (e.g., Maternal, Infant, and Early Childhood Home Visiting Program) and/or state programs (e.g., state departments of elementary or secondary education). PAT visits are provided free of charge to any parents who are high needs, defined by low educational attainment, low income, parent or child with disabilities and/or chronic health condition, recent immigrant family, parent with mental illness, or unstable housing (15). In 2016 and 2017, PAT was located in all 50 states and reached nearly 190,000 families, 227,000 children, and 20,100 pregnant women (16).

We previously found that working with PAT provided an effective approach for implementing dietary interventions targeted to African American parents of infants (17), rural parents of young children (18), teen mothers (9), and overweight mothers at risk for diabetes (19). In addition, we recently completed a randomized controlled trial to determine whether partnering with PAT to provide a home-based lifestyle intervention could overcome barriers to behavior change and decrease GWG in a high-risk population (20). Our data demonstrated that compared with standard PAT, embedding a lifestyle intervention focused on eating and physical activity behavior change strategies within the PAT prenatal program (PAT+Lifestyle) decreased GWG and lowered maternal systolic blood pressure. However, there was no difference in other maternal cardiometabolic outcomes, pregnancy complications, or neonatal outcomes. The effect of continuing this intervention on postpartum weight and metabolic health is not known.

The primary purpose of the present randomized controlled trial was to determine the efficacy of PAT+Lifestyle, provided both prenatally and after delivery, in minimizing the long-term, 12-month postpartum increase in body weight that often occurs in SED African American women who have overweight or obesity at the onset of pregnancy. In addition, we assessed obesity-related cardiometabolic outcomes (i.e., blood pressure, insulin sensitivity, and lipid profile) at 12 months post partum as well as the cost of providing the PAT+Lifestyle intervention. We hypothesized that compared with women randomized to standard PAT, those randomized to PAT+Lifestyle would have a blunted increase in body weight at 12 months post partum and a healthier cardiometabolic profile at minimal additional cost.

Methods

Study participants

The study population was composed of 267 women who were recruited from the obstetrics clinics at a single medical center (Barnes-Jewish Hospital and Washington University School of Medicine in St. Louis, Missouri) between October 2012 and March 2016. All participants identified as African American and met the following additional eligibility criteria: (1) age 18 to 45 years, (2) BMI 25.0 to 45.0 kg/m^2 measured at the initial visit during the first trimester, (3) singleton viable gestation at or before 15 0/7 weeks (established by date of last menstrual period if it was within 5 days of first trimester ultrasound dating or by ultrasound itself), and (4) SED determined by Medicaid status or home zip code associated with a median household income below the poverty level. All women provided written informed consent before their participation in this study, which was approved by the Institutional Review Board of Washington University in St. Louis (ClinicalTrials.gov identifier NCT01768793).

Procedures

This study was conducted at one site of the Lifestyle Intervention for Expectant Moms (LIFE-Moms) consortium, a collaborative group evaluating the effect of lifestyle therapies on maternal GWG and maternal, fetal, and infant health in pregnant women with overweight or obesity (21). Women were randomly assigned by study staff in a 1:1 allocation to treatment with either standard PAT or PAT+Lifestyle, which began after the baseline assessment and continued until 12 months after parturition. A random number generator and a fixed allocation block strategy provided by study statisticians were used to determine the randomization sequence. Investigators and clinical research staff who were involved in collecting primary and secondary outcome data did not deliver the intervention and were blinded to group assignment. The results from the prenatal intervention (baseline to 35 weeks) were previously reported (20). Data were obtained at 15 weeks of gestation (baseline) and 12 months after delivery by research staff at the Washington University Clinical and Translational Research Unit. Body weight, plasma glucose, insulin, and lipid concentrations were collected as well as the plasma glucose and insulin response to an oral glucose load (blood samples obtained before and at 30, 60, 90, and 120 minutes after ingesting a 75-g glucose drink).

Intervention staff, consisting of parent educators overseen by a study interventionist, were responsible for conducting all aspects of either the standard PAT or PAT+Lifestyle intervention. Intervention staff were not involved in primary or secondary data collection. To assure intervention fidelity, parent educators audio-recorded each of their home visits and completed lesson plan checklists documenting delivery of content. The study interventionist randomly observed four home visits and reviewed four audio-recorded visits each year for each parent educator to assure satisfactory completion of content. The additional cost per family of providing the PAT+Lifestyle intervention to standard PAT was calculated using PAT recommended cost and budgeting guidelines (15) which includes parent educator salary, training costs, home visit preparation and contact time, travel reimbursement based on car mileage, and cost of supplies per visit.

All participants were seen by parent educators during home visits every other week during pregnancy and every month for 12 months after delivery. The standard PAT curriculum provided parents with evidence-based maternal, infant, and early childhood information designed to increase parenting knowledge and skills using a family strength-based model to support the role of the parent as the child's first and best teacher (22). Parent educators delivering the standard PAT prenatal curriculum prepared the mother for what to expect with a new baby by providing developmentally appropriate child-focused information; the curriculum does not include information on maternal weight or lifestyle change. After childbirth, the parent educator offered social support for parents in meeting the physical, emotional, and psychological milestones as children transition across developmental stages (22).

The PAT+Lifestyle postpartum curriculum goal was for mothers to return to their baseline weight by reinforcing the eating and activity behaviors learned prenatally while also addressing challenges faced by the new parent of an infant (e.g., child feeding, sleep deprivation),

as described in detail elsewhere (20). The PAT+Lifestyle curriculum embedded content adapted from the Diabetes Prevention Program within the standard PAT curriculum and home visits (23). An evaluation of the mother by the PAT parent educator was used to individualize the lifestyle content to address specific eating and physical activity behaviors that affect energy intake and physical activity (e.g., substitute water for sugar-sweetened beverages, reduce portion sizes, walk 30 minutes every day). Social cognitive theory was used to promote behavior change by emphasizing parenting roles and targeting intrapersonal (e.g., self-assessment, goal setting, reinforcement), interpersonal (e.g., observational learning, parental modeling), and home environment (e.g., child exposure to media or television, food access) strategies (24). In addition to training on the standard curriculum, PAT+Lifestyle parent educators received 8 hours of additional training including (1) an overview of the intervention protocol, (2) home visit practice sessions with other parent educators, and (3) feedback from trainers. Because the PAT+Lifestyle intervention was embedded within the standard curriculum, it was reimbursable as part of routinely delivered home visits.

The primary outcome of this study was percent change in body weight from baseline to 12 months after delivery. Secondary outcomes were (1) proportion of women returning to baseline weight at 12 months post partum and (2) proportion of women with GWG (total weight gain from the baseline visit to 35-36 weeks of gestation visit) categorized as either above or not above the Institute of Medicine (IOM) guidelines for weight gain during pregnancy (25).

Statistical analysis

A modified intention-to-treat analysis was performed. All subjects were analyzed within the group to which they were randomized unless they provided no follow-up data or could not provide valid data because of a second pregnancy. Baseline demographic factors and characteristics of each treatment group were compared using the *t* test or Mann-Whitney *U* test (continuous variables) or the χ^2 or Fisher exact test (categorical variables), as appropriate. Normality was tested with the Kolmogorov-Smirnov test. To test the primary hypothesis, an analysis of covariance was performed to determine whether there was a significant difference in weight change and metabolic measures between the baseline and 12-month postpartum visit by intervention group. Block randomization was used to balance the treatment groups on maternal age, BMI at randomization, baseline weight (weight at randomization), gestational age at randomization, Medicaid status, education, income, gravidity, nulliparity, gestational diabetes, infant birth weight, and breastfeeding initiation. We tested for confounding factors to further evaluate whether any unexpected imbalances between groups could have affected our results. BMI and gestational age at randomization were chosen a priori as confounders in the final models. The proportion of women with a 12-month postpartum weight that returned to or dropped below baseline weight was compared by intervention group using the χ^2 or Fisher exact test as appropriate, and log binomial regression was used to compute relative risk and 95% CI. Women with missing data on prespecified factors were excluded from analysis as per study protocol; missing data were assumed to be missing at random. A sensitivity analysis was conducted to compare women who completed and did not complete the 12-month postpartum visit on maternal age, BMI, weight, and gestational age at baseline, Medicaid status, education, income, gravidity, nulliparity, gestational diabetes, infant birth weight, and breastfeeding initiation. $P < 0.05$ was considered statistically significant. SAS version 9.4 (SAS Institute Inc., Cary, North Carolina) was used for all analyses.

Power computations were based on the primary end point of percentage of subjects meeting IOM guidelines for GWG and on two-sided tests at the 0.05 level of significance, as described previously (20). We estimated that 57% of standard PAT participants would meet IOM recommendations for GWG, and that 120 participants who completed the intervention in each group would yield a power of 0.8 to detect a 30% increase to 74% in the PAT+Lifestyle group and a power of 0.9 to detect a 35% increase to 77%. We expected a 10% dropout rate prior to parturition and successfully sought to randomize 133 participants into each group. Based on the assumption that 100 participants would remain at 12 months after delivery, the power was 0.8 and 0.9 or 93% and 95%, respectively.

Results

Participant demographics and flow

The flow of participants throughout the study is shown in Figure 1. Baseline characteristics of the study participants were not different between groups (Table 1). Gestational age at the prenatal visit used to define BMI was 13.3 (SD 1.6) weeks. Among the 267 randomized participants, 185 completed the 12-month postpartum visit. The major reasons for noncompletion were women who were withdrawn because of a new pregnancy (8.9%) and women who could not be located (17.9%). Excluding participants who were ineligible because of new pregnancy, the retention rate for the 12-month visit was 76.1%. No significant differences in baseline characteristics were observed between women who completed versus those who did not complete the 12-month postpartum visit in the sensitivity analysis (data not shown).

Body weight

The increase (mean ± SEM) in body weight from baseline to 12 months after delivery, after adjusting for BMI and gestational age at randomization, was less in the PAT+Lifestyle group than in the standard PAT group (2.5 ± 7.4 kg vs. 5.7 ± 8.8 kg; $P = 0.01$) (Figure 2). In women who did not exceed the IOM guidelines for GWG, those treated with PAT+Lifestyle retained less weight at 12 months after delivery than those treated with standard PAT (0.9 ± 6.8 kg and 4.2 ± 8.6 kg; $P = 0.03$) after adjusting for BMI and gestational age at randomization. In women who exceeded the IOM guidelines for GWG, those treated with PAT+Lifestyle tended to retain less weight at 12 months post partum than those treated with standard PAT. However, the differences between groups were not statistically significant (4.9 ± 7.7 kg and 7.6 ± 8.9 kg; $P = 0.19$). A greater percentage of women in the PAT+Lifestyle group than in the standard PAT group returned to their baseline weight or less at 12 months post partum (38.0% and 21.5% in PAT+Lifestyle and standard PAT groups, respectively; $P = 0.01$); the difference between groups remained statistically significant after adjusting for BMI and gestational age at randomization (adjusted relative risk 2.24; 95% CI: 1.17-4.29).

Cardiometabolic outcomes

No significant differences in changes in blood pressure, indices of glycemic control and insulin sensitivity, or plasma lipid profile from

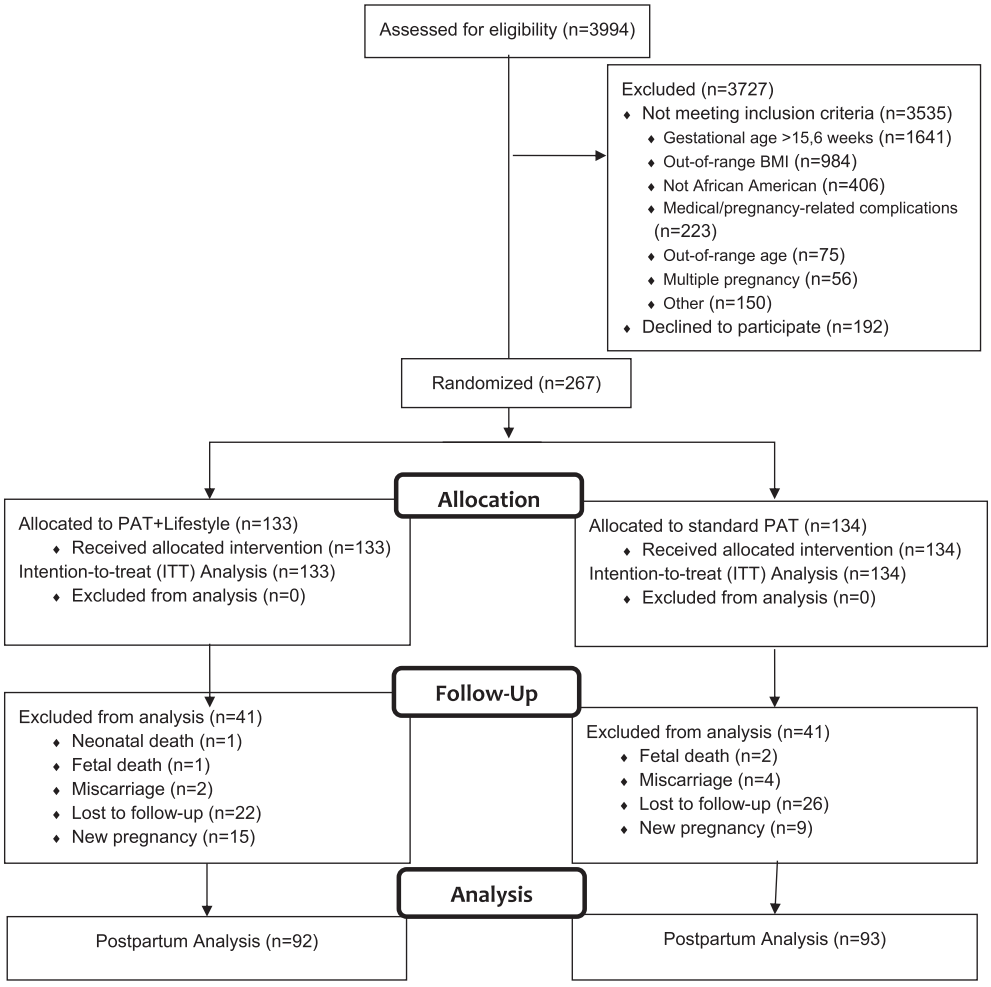


Figure 1 Flow of study participants.

baseline to 12 months post partum were detected between PAT+Lifestyle and standard PAT groups (Table 2).

Compliance with visits and cost of intervention

The median number [IQR] of total prenatal and postpartum home visits was not different between women treated with PAT+Lifestyle and those treated with standard PAT (17 [12-21] and 16 [13-20] visits, respectively; $P = 0.72$). The postpartum visits accounted for 48.5% of the total number of visits, and the median number of postpartum visits was not different between groups (9 [5-12] and 8 [4-12] visits for PAT+Lifestyle and standard PAT, respectively; $P = 0.56$). The average duration of each visit was longer in the PAT+Lifestyle than the standard PAT group (49.8 ± 10.3 minutes and 38.2 ± 13.0 minutes; $P < 0.01$). Overall, the fidelity to the intervention was 75% (75%-100%).

The cost to implement standard PAT was calculated based on standard parent educator training costs of $1,400 with a yearly professional development cost of $450, the average parent educator salary for 2 hours of preparation time plus the cost of a 1-hour home visit ($54.69), the mileage estimate per visit ($10.80), and the supplies per visit ($5.00). Costs for the PAT+Lifestyle intervention included the standard intervention costs plus the costs for the additional 8 hours of training ($450 per parent educator). Even though the duration of the home visits was longer in the PAT+Lifestyle intervention, it did not exceed the 60 minutes allotted for completing a home visit, on which costs for reimbursement were calculated. Therefore, the total cost per family to implement standard PAT and PAT+Lifestyle from early pregnancy until 12 months post partum was $1,160.65 and $1,241.68, respectively; the additional cost per family for providing PAT+Lifestyle was $81.03. The addition of lifestyle therapy to standard PAT was covered as part of routine home visits and did not result in any charges to the family.

Discussion

This randomized controlled trial was conducted to evaluate whether a home-based parent education program (PAT+Lifestyle) delivered both prenatally and after delivery, could limit weight gain from early pregnancy (~15 weeks of gestation) to 12 months post partum in underserved SED African American women with overweight or obesity at the

TABLE 1 Baseline characteristics of standard PAT and PAT+ Lifestyle groups

	Standard PAT (n = 93)	PAT+Lifestyle (n = 92)	P value
Maternal age (y)[a]	26.2 ± 5.0	24.7 ± 5.0	0.06
Gestational age at randomization (wk)[b]	14 (12-15)	14 (12-15)	0.99
Baseline weight (kg)[a]	86.4 ± 15.0	87.2 ± 15.8	0.72
Baseline BMI (kg/m^2)[a]	31.9 ± 5.0	32.7 ± 5.2	0.29
BMI category[c]			0.68
Overweight	34 (35.6)	31 (33.7)	
Obesity	59 (63.4)	61 (66.3)	
On Medicaid[c]	84 (90.3)	83 (90.2)	0.98
Maternal education[c]			0.46
Less than high school	15 (16.1)	17 (18.5)	
High school graduate	36 (38.7)	44 (47.8)	
Some college	33 (35.4)	24 (26.1)	
College graduate	9 (9.7)	7 (7.6)	
Income level[c]			0.62
<$25,000	84 (90.3)	85 (92.4)	
≥$25,000	9 (9.7)	7 (7.6)	
Gravidity[b]	2 (1-3)	2 (1-3)	0.17
Nulliparous[c]	17 (18.3)	23 (25.0)	0.27
Gestational diabetes[c]	9 (9.7)	10 (10.9)	0.79
Infant birth weight (g)[a]	3,132.7 ± 442.9	3,106.4 ± 442.8	0.71
Initiated some breastfeeding[c]	61 (65.6)	65 (70.7)	0.46
Weeks of breastfeeding[b]	8 (4-24)	15 (5-24)	0.25

[a]Data are mean ± SD; P value based on t test.
[b]Data are median (IQR); P value based on Mann-Whitney U test.
[c]Data are n (%); P value based on χ^2 or Fisher exact test.

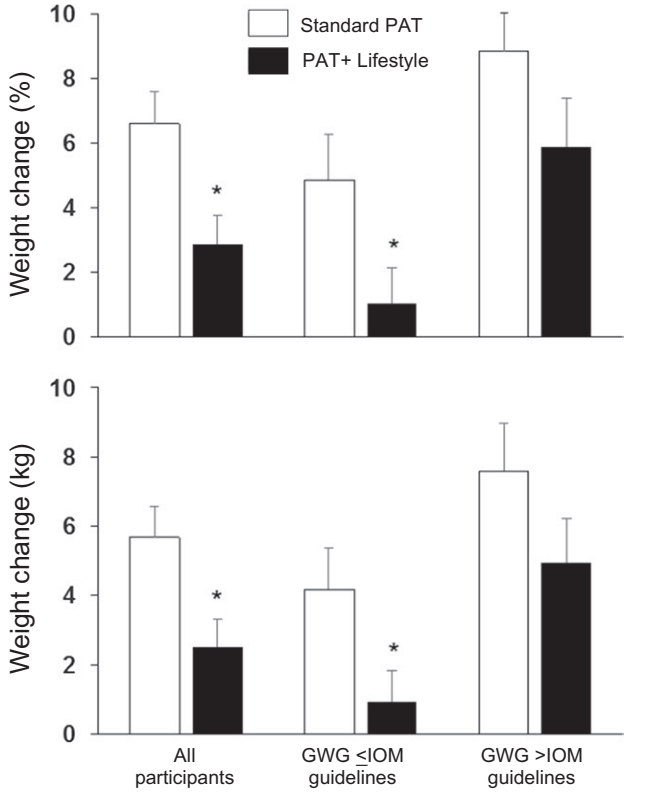


Figure 2 Percent (top panel) and absolute (bottom panel) change in body weight from baseline to 12 months post partum in women treated with standard PAT (white bars) or PAT+Lifestyle (black bars), both for total participants and subgroups in whom gestational weight gain (GWG) was either not greater than or was greater than Institute of Medicine (IOM) guidelines. *Value significantly different from corresponding standard PAT value; $P \leq 0.03$. Values are mean ± SEM.

onset of pregnancy. Our data demonstrated that women who recieved PAT+Lifestyle gained less weight and were more likely to return to their baseline weight at 12 months after parturition than women treated with the standard PAT program. In addition, the cost of providing PAT+Lifestyle during pregnancy and 12 months post partum was only about $81 more than providing standard PAT. This home-based lifestyle intervention program successfully reduced weight gained during pregnancy and retained during the postpartum period in a vulnerable, high-risk population. Moreover, providing this therapy in partnership with an established national home-visiting program allowed for widespread dissemination at minimal additional cost.

The results from several randomized controlled trials have shown that providing lifestyle therapy only during pregnancy or the postpartum period does not decrease the amount of weight gained from the onset of pregnancy to 12 months after delivery (4,26-31). We are aware of one study, the Delta Healthy Sprouts Trial, that used PAT to provide home-based lifestyle weight management during pregnancy and 12 months post partum (10,32). That trial, conducted in women living in the rural Lower Mississippi Delta region, did not detect a significant difference in postpartum weight loss or retention between women treated with PAT lifestyle-enhanced intervention and those treated with PAT alone. The reasons for the different outcomes in the Delta Healthy Sprouts Trial and our study are not clear but may be related to differences in study populations and the lifestyle curriculum. Nearly half of the participants in the Delta Healthy Sprouts Trial had normal weight before pregnancy, and that trial enrolled fewer participants than our study, which may have decreased the ability to detect differences between treatment groups. The lifestyle curriculum in the Delta Healthy Sprouts Trial also involved a complex intervention, including personalized eating plans that targeted energy restriction, diet quality, and multiple behaviors simultaneously. In contrast, PAT+Lifestyle focused on a limited number of specific and simple eating and activity behaviors, individualized to the family's needs and embedded within standard parent-child activities and content of routine home visits, requiring limited additional time (20).

Despite the beneficial effects of PAT+Lifestyle on postpartum body weight, there were no therapeutic effects on cardiometabolic outcomes. However, the health benefits of minimizing total weight gain that occurs from the onset of pregnancy to 12 months after delivery in women with overweight or obesity are likely to occur years later by reducing or preventing the medical complications associated with weight retention after pregnancy and a chronic increase in body fat (33). Data from previous studies have shown

TABLE 2 Cardiometabolic variables at baseline and 12 months post partum in standard PAT and PAT+Lifestyle groups

	Standard PAT (*n* = 93)		PAT+Lifestyle (*n* = 92)		
	Baseline	12 months post partum	Baseline	12 months post partum	*P* value[a]
SBP (mmHg)	110.9 ± 10.9	118.6 ± 12.8	119.1 ± 10.4	115.1 ± 10.7	0.80
DBP (mmHg)	67.3 ± 8.3	71.7 ± 10.1	67.2 ± 8.8	72.4 ± 10.7	0.63
Glucose (mg/dL)	81.0 ± 6.2	88.2 ± 7.8	89.4 ± 7.6	89.4 ± 7.5	0.34
Insulin (uU/mL)	11.8 ± 7.6	15.0 ± 9.6	13.4 ± 7.7	17.2 ± 10.4	0.41
HOMA-IR	2.41 ± 1.7	3.29 ± 2.3	2.76 ± 1.8	3.88 ± 2.6	0.33
Glucose AUC (mg/dL × 120 min)	15,341 ± 2,134	15,817 ± 2,043	15,179 ± 1,747	16,021 ± 2,235	0.26
Insulin AUC (uU/dL × 120 min)	13,787 ± 8,669	13,048 ± 8,249	14,744 ± 7,622	13,417 ± 7,779	0.85
OGIS	399 ± 69	376 ± 66	391 ± 68	367 ± 64	0.56
Cholesterol (mg/dL)	161.0 ± 31.9	144.6 ± 29.6	161.1 ± 30.9	146.0 ± 27.2	0.68
LDL cholesterol (mg/dL)	81.5 ± 25.0	85.9 ± 24.1	83.6 ± 25.4	88.0 ± 24.1	0.84
Triglycerides (mg/dL)	84.0 ± 37.5	62.0 ± 34.7	81.9± 26.8	62.3 ± 29.9	0.85
HDL cholesterol (mg/dL)	62.6 ± 13.9	46.3 ± 11.8	61.1 ± 11.2	46.2 ± 11.0	0.56

Data are mean ± SD.
[a]Significance of difference between intervention groups in the change in measures obtained at baseline and 12 months post partum; *P* value based on analysis of covariance.
AUC, area under the curve; DBP, diastolic blood pressure; HDL, high-density lipoprotein cholesterol; HOMA-IR, homeostatic model assessment for insulin resistance; LDL, low-density lipoprotein cholesterol; OGIS, oral glucose insulin sensitivity; SBP, systolic blood pressure.

GWG and postpartum weight retention at 12 months are associated with changes in weight status and the development of obesity-related comorbidities decades after pregnancy (34,35). Early adulthood (18-35 years of age) is a vulnerable period for excessive weight gain and the development of obesity, particularly among African American women and those who already have overweight (33,34,36,37). A 5-kg weight gain during early adulthood, which is less than the average weight gained in women treated with standard PAT in our study, was shown to be associated with an increased risk of serious diseases, including type 2 diabetes, cardiovascular disease, and cancer, by middle and later adulthood (33). Minimizing total prenatal and postpartum weight gain in SED African American women by treatment with PAT+Lifestyle has considerable clinical implications by preventing future obesity-related medical comorbidities.

Implementing effective lifestyle change in pregnant or postpartum SED women has been shown to be difficult because of the many burdens that interfere with participation or intervention uptake, including limited finances, work responsibilities, and childcare support (38). The use of PAT to provide lifestyle weight management therapy takes advantage of a home-visiting structure that is free of charge, already is accepted by the mother, and overcomes many of the major barriers for implementing successful lifestyle therapy in SED African American women (23,39,40). Additionally, PAT services are delivered until the last child in the home reaches school age, allowing for ongoing reinforcement of lifestyle behavior change. The additional cost of PAT+Lifestyle for the entire prenatal and 12-month postpartum intervention was minimal. Because the content is delivered as part of the standard PAT routine visit, it is covered by federal and state funds, providing ongoing support for implementation.

This study has several limitations. The generalizability of our results may be limited because participants were from a single racial or ethnic group and were from homogeneous sociodemographic and geographic backgrounds, which may not translate to other populations. In addition, we evaluated women only at 12 months after delivery, so we are unable to determine whether results will be maintained long term and to inform patterns of weight gain or loss over time.

In conclusion, the present study demonstrates that providing a home-based lifestyle weight management therapy effectively minimizes maternal weight gain at 12 months after delivery in underserved SED African American women with overweight or obesity at the onset of pregnancy. Embedding PAT+Lifestyle within the national infrastructure of PAT overcomes many of the barriers faced by SED women that prevent active participation in this kind of intervention. Moreover, PAT, which has more than 3,200 sites across the United States, provides a sustainable and scalable program for providing an effective weight management intervention for this high-risk population. Based on these findings, the PAT National Center, which is responsible for training and certifying all parent educators to deliver PAT curricula, is planning to disseminate and implement PAT+Lifestyle through its national network of sites. Additional research will be needed to determine whether extending PAT+Lifestyle throughout the entire PAT program has important long-term maternal weight and health benefits.O

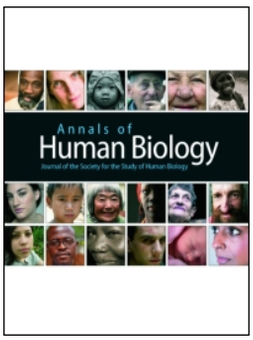
Acknowledgments

The authors thank the study subjects for their participation, the study staff for their help in conducting this study, and the LIFE-Moms consortium members for their contributions to the development and oversight of the common measures and procedures shared across the trials. All data generated from this project will be administered in accordance with both University and NIH policies, including the most current NIH data release and resource sharing policy. The results from this work will be presented at scientific meetings, published in scientific journals, and made freely available to the public according to NIH guidelines.

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Annals of Human Biology

ISSN: 0301-4460 (Print) 1464-5033 (Online) Journal homepage: http://www.tandfonline.com/loi/iahb20

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To cite this article: Joseph Keaweʻaimoku Kaholokula, Claire Townsend Ing, Mele A. Look, Rebecca Delafield & Kaʻimi Sinclair (2018): Culturally responsive approaches to health promotion for Native Hawaiians and Pacific Islanders, Annals of Human Biology, DOI: 10.1080/03014460.2018.1465593

To link to this article: https://doi.org/10.1080/03014460.2018.1465593

Published online: 29 May 2018.

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ANNALS OF HUMAN BIOLOGY
https://doi.org/10.1080/03014460.2018.1465593

REVIEW ARTICLE

Culturally responsive approaches to health promotion for Native Hawaiians and Pacific Islanders

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ABSTRACT

Context: Obesity, diabetes and cardiovascular disease (CVD) have reached epidemic proportions among Native Hawaiians/Pacific Islanders (NHPI). Culturally responsive interventions that account for their interpersonal, sociocultural and socioeconomic realities are a public health priority.

Objective: To describe cultural adaptation and culturally grounded approaches to developing health interventions for NHPI and to review the culturally responsive approaches used by, and outcomes from, two long-standing community-based participatory research projects (CBPR) in Hawai'i: PILI 'Ohana and KāHOLO Projects.

Methods: A literature review of 14 studies from these two projects was done to exemplify the methods applied to culturally adapting existing evidence-based interventions and to developing novel interventions from the 'ground up' to address health disparities in NHPI. Of the 14 studies reviewed, 11 were studies of the clinical and behavioural outcomes of both types of interventions.

Results: Both culturally adapted and culturally grounded approaches using community-based assets and NHPI cultural values/practices led to establishing sustainable and scalable interventions that significantly improved clinical measures of obesity, diabetes and hypertension.

Conclusion: Several recommendations are provided based on the lessons learned from the PILI 'Ohana and KāHOLO Projects. Multidisciplinary and transdisciplinary research using CBPR approaches are needed to elucidate how human biology is impacted by societal, environmental and psychological factors that increase the risk for cardiometabolic diseases among NHPI to develop more effective health promotion interventions and public health policies.

ARTICLE HISTORY
Received 20 October 2017
Revised 3 February 2018
Accepted 12 March 2018

KEYWORDS
Native Hawaiians; Pacific Islanders; health promotion; intervention; obesity; diabetes; cardiovascular disease; cardiometabolic

Introduction

Obesity, diabetes and cardiovascular disease (CVD) are interrelated cardiometabolic conditions that have reached epidemic proportions among Pacific Islander populations (Mau et al., 2009; Hawley and McGarvey, 2015), people with origins from the Pacific regions known as Melanesia (e.g. Fiji and Vanuatu), Polynesia (e.g. Hawai'i, Sāmoa and Tonga), and Micronesia (e.g. Chuuk and Guam). The highest rates of obesity and diabetes in the world are found in the Pacific Region (e.g. Nauru, American Sāmoa and Vanuatu) (Chan et al., 2014). Once healthy and robust populations, their health has been negatively impacted by centuries of colonisation and exploitation by foreign powers, leading to cultural loss and economic deprivation (Spickard et al., 2002). Economic conditions, limited healthcare and educational opportunities and the effects of global warming in the Pacific have led to a diaspora of Pacific Islanders to countries such as New Zealand, Australia and the US, where they continue to face economic and acculturation-related challenges and discrimination that impact their physical and mental health status (Spickard et al., 2002; Ahlgren et al., 2014).

In the US, Native Hawaiians (NH) and other Pacific Islanders (PI) face discrimination and experience socioeconomic circumstances that place them at risk for cardiometabolic related disorders (Kaholokula et al., 2009). The combined prevalence of overweight and obesity is 73.4% among NHPI (Native Hawaiians/Pacific Islanders), which is 20% greater than non-Hispanic Whites (Schiller et al., 2012). The prevalence of diabetes (Kirtland et al., 2015) and heart disease is 19% and 19.7%, respectively, among NHPI compared to 5% and 6.6% for non-Hispanic Whites (Grandinetti et al., 2007; CDC, 2014; Kirtland et al., 2015). NHPI also suffer a stroke an average of 10 years younger than non-Hispanic Whites, in part due to poorer hypertension management (Nakagawa et al., 2012). In Hawai'i, the state with the largest NHPI population in the US, they are more likely to live in obesogenic environments (Mau et al., 2008) and experience a decade shorter lifespan than Japanese and Chinese, the longest living ethnic groups in Hawai'i (Wu et al., 2017). Thus, reducing the risk of cardiometabolic disorders in NHPI through the development of health interventions and policies is a public health priority (Cook et al., 2010).

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The high prevalence of cardiometabolic disorders among NHPI has been attributed to genetic/biological dispositions (Minster et al., 2016), lifestyle behaviours (e.g. calorie-dense diet and physical inactivity) (Kolonel et al., 2000), socioeconomic deprivation (e.g. lower income and education levels), sociocultural challenges (e.g. colonisation and acculturation stressors) (Kaholokula et al., 2009), psychosocial stressors (e.g. discrimination) (Kaholokula et al., 2010), environmental conditions (Mau et al., 2008) and complex permutations of these variables (Kirtland et al., 2015). Health interventions targeting cardiometabolic disorders in NHPI communities need to be culturally responsive and account for their interpersonal, sociocultural and socioeconomic realities.

In this article, an overview of culturally responsive approaches to health intervention development—cultural adaptation and cultural grounding—in the context of community-based participatory research (CBPR) is first provided. Following this is a literature review of studies from two long-standing CBPR projects in Hawai'i, *The PILI 'Ohana Project*[1] and the *KāHOLO Project*[2], that developed health interventions for NHPI using cultural adaptation and culturally grounded approaches. The principles and steps involved in both approaches will be illustrated and the clinical, behavioural, and psychosocial outcomes resulting from these interventions will be discussed. Table 1 summarises the characteristics and findings of the intervention outcome studies from the two projects reviewed in this article.

Culturally responsive approaches to health intervention

Health interventions that are not aligned with the cultural values, perspectives, and preferred modes of living of the target population are presumed to be less effective than culturally responsive interventions that account for these factors (Jumper-Reeves et al., 2014). Most evidence-based interventions (EBI) are developed using Western-centric theories of behaviour change and behavioural strategies tested in samples of predominately non-Hispanic Whites. For example, the Diabetes Prevention Program–Lifestyle Intervention (DPP-LI) is an EBI found effective in reducing a person's risk for diabetes by addressing excess body weight (Hamman et al., 2006), which has been widely disseminated (Jiang et al., 2013; Dunkley et al., 2014; Hall et al., 2016). However, weight-loss outcomes between ethnic groups have been shown to differ given the same EBI targeting their lifestyle behaviours, with non-Hispanic Whites often having better outcomes (Kumanyika et al., 2002; West et al., 2008). These differences in outcomes may be due to cultural differences between ethnic groups not accounted for by an EBI developed and tested with a dissimilar cultural group (Kumanyika et al., 2002; Kumanyika, 2008).

Although NHPI share many cultural similarities (e.g. deep ancestral origins, adaptation to island living, family/community orientation and cultural changes due to occupation by Western powers), especially when compared to European or Asian cultures, there are also many cultural dissimilarities (e.g. language, socio-political structures and aspirations) that should be considered during intervention development. Okamoto et al. (2014) describe a continuum of approaches in developing culturally responsive health interventions, anchored on one end by cultural adaptation and the other by culturally grounded approaches. Culture, as defined by Haynes et al. (in press) is 'the shared patterns of behaviours and interactions, cognitive constructs, and affects that are learned through a process of socialisation and that distinguish members of a group from members of another group'.

Cultural adaptation is the most common approach to adapting an EBI for a new population; that is, modifying an intervention found efficacious through rigorous scientific study in another population with different cultural characteristics to fit the cultural characteristics of a new population. Essentially, the goal of cultural adaptation is to preserve the core elements of the original intervention while incorporating culturally relevant elements. Adaptations can take the form of surface structure modifications, such as changing the programme's name, terms used and food/eating examples to be culturally specific (e.g. using the native language and metaphors) and geographically local (Castro et al., 2004). Adaptations can also take the form of deep-structure changes in which substantial changes are made to the EBI, such as incorporating the new cultural group's perspectives (e.g. worldviews and values) and practices into the core elements (Resnicow et al., 1999).

Culturally grounded approaches are those in which the sociocultural context is at the core of the intervention and elements of the programme are based on the worldviews, beliefs and customs of the target population (Palmer-Wackerly et al., 2014; Lauricella et al., 2016). These types of interventions are referred to as originating from the 'ground-up' because they emerge from the cultural group's own worldviews and preferred practices rather than relying solely on Western notions of health promotion (Walters et al. in press). Okamoto et al. (2014) recommended culturally grounded approaches for populations where there is a high need for intervention, the science to inform adaptation is lacking and there is a high scientific and health impact that could result from the development of 'ground up' interventions. Ironically, many of the culturally grounded approaches proposed are actually a return to traditional worldviews and practices that were part of everyday life for indigenous communities and a source of their wellbeing prior to Western intrusion. In Pacific cultures, such culturally grounded approaches have involved the use of traditional dances to reduce CVD risk (Look et al., 2012) and dietary patterns for obesity treatment (Shintani et al., 1999) and connecting health to spirituality for improving cancer awareness and screening (Aitaoto et al., 2007).

Community-based participatory research approaches in health interventions

CBPR is an approach to research that equitably and meaningfully involves relevant stakeholders of a specified community, such as its members, leaders and community-based organisations (e.g. churches, community health centres and cultural

Table 1. Characteristics of the intervention outcomes studies from the PILI 'Ohana and KāHOLO projects reviewed.

Source	Participants	Target condition	Design	Intervention	Key findings
Mau et al. (2010)	169 NHOPI adults with BMI $\geq$ 25 • NH 52% • Chuukese 27% • Samoan 12% • Filipino 5% • OPI 1% • Non-OPI 2%	Overweight/Obesity	Pre–post evaluation; CBPR	PLP's 3-month culturally adapted DPP-LI phase	Mean weight loss was −1.5 kg (95% CI = −2.0, −1.0) at 3-months, with 26% losing >3% of their baseline weight. Mean weight loss among those who completed all eight lessons was significantly higher (−1.8 kg, 95% CI = −2.3, −1.3) than those who completed less than eight lessons (−0.70 kg, 95% CI = −1.1, −0.29).
Kaholokula, Mau, et al. (2012)	144 NHOPI adults with BMI $\geq$ 25 • NH 52% • Chuukese 26% • Samoan 11% • Filipino 7% • OPI 3% • Non-OPI 3%	Overweight/Obesity	RCT; CBPR	PLP's 6-month family and community focused WLM phase ($n = 72$) vs standard behavioural follow-up group (SBG; $n = 72$)	Participants of both groups achieved significant weight loss maintenance ($p \leq 0.05$) after completing the 3-month CA DPP-LI. PLP participants who completed at least half of the prescribed sessions were 5.1-fold (95% CI = 1.06–24; $p = 0.02$) more likely to have maintained their initial weight loss than SBG participants.
Sinclair et al. (2013)	82 NHOPI adults with type 2 diabetes and A1c $\geq$ 7%	Diabetes	RCT; CBPR	3-month culturally adapted PIC programme ($n = 48$) vs waitlist control ($n = 34$)	Significant baseline adjusted differences found at 3 months between PIC and waitlist control group in intent-to-treat (−1.6 vs −0.3; $p < 0.001$) and complete case analyses (−1.1 vs −0.3; $p < 0.0001$) for A1c and in diabetes understanding and in performing diabetes self-management.
Kaholokula et al. (2013)	100 NHOPI adults with BMI $\geq$ 25 • NH 71% • Chuukese 22% • OPI 22%	Overweight/Obesity	Observational; CBPR	9-month PLP and SBG	Ethnicity, sex, initial weight loss, fat in diet at baseline, change in SBP, and intervention type were associated ($p \leq 0.05$) with $\geq$3% weight loss at 9 months. Adjusted for other variables, Chuukese (OR = 6.04; CI = 1.14–32.17), participants with greater weight loss in the 1st 3-months (OR = 1.47; CI = 1.22–1.86), and those who were in the PLP (OR = 4.50; CI = 1.50–15.14) were more likely to achieve $\geq$3% weight loss at 9 months.
Kaholokula, Wilson, et al. (2014)	239 NHOPI adults with BMI $\geq$ 25 • NH 52% • Chuukese 9% • Samoan7% • Filipino 5% • OPI 1% • Non-OPI 7%	Overweight/Obesity	Pre–post evaluation; CBPR	PLP's 3-month culturally-adapted DPP-LI phase	Significant improvements in weight (−1.7 kg ±3.5), SBP (−3.3 mmHg ±18.6), DBP (−3.4 mmHg ±12.5), physical functioning measured by 6 minute walk test (106.6 ft ±238.4), exercise

(*continued*)

Table 1. Continued

Source	Participants	Target condition	Design	Intervention	Key findings
					frequency and fat in diet were found. Larger baseline weight ($p = 0.002$) and type of CBO ($p = 0.007$) delivering the intervention predicted weight loss. CBO with predominately NH and ethnically homogenous intervention groups had greater weight loss.
Townsend et al. (2014)	112 employees of 10 NH serving organisations with BMI ≥ 25 • NHOPI 60% • Other 40%	Overweight/Obesity	Preliminary pre–post evaluation; CBPR	PLP's 12-month culturally-adapted DPP-LI and family and community WLM (workplace version)	Significant improvements in weight (–1.86 kg ±4.16), physical functioning measured by 6 minute walk test (93.37 ft ± 145.47), exercise frequency, fat in diet, weight locus of control, eating self-efficacy and family support were found at 12-month follow-up. Eating self-efficacy at baseline was associated with weight change at 12-month from baseline ($p < 0.01$).
Townsend et al. (2016)	217 employees of 15 NH serving organisations with BMI ≥ 25 • NH 38% • OPI 21% • Asian 21% • Caucasian 14% • Other 2%	Overweight/Obesity	Pre–post evaluation; CBPR	PLP's 3-month culturally-adapted DPP-LI phase (workplace version)	Significant improvements in mean weight loss (–1.2 kg ± 2.63), BMI (–0.45 ± 0.97), SBP (–2.8 ± 12.5), DBP (–2.01 ± 8.05), physical functioning 6 minute walk test (74.65 ± 154.71), fat in diet scores, physical activity level, family support and eating self-efficacy were achieved at 3-month follow-up. Baseline weight and change in DBP, physical activity level, community support and locus of weight control were independently and significantly associated with 3-month weight loss.
Ing et al. (2016)	47 NHOPI adults with type 2 diabetes and A1c $\geq$7% • NH 57% • Micronesian 34% • Filipino 4% • Other 4%	Diabetes	RCT; CBPR	3-month culturally adapted PIC programme and randomisation to either SSG ($n = 25$) or control ($n = 22$)	Significant improvements in HbA1c (-0.76 ± 1.86), diabetes-related self-management knowledge (0.73 ± 0.97) and self-management behaviours (-11.1 ± 21.87). While the SSG group had a significant decrease in systolic blood pressure from 3- to 6-month assessment and the control group did not, there were no significant differences across the groups.
Delafield et al. (2016a)	343 NHOPI adults with BMI ≥ 25	Overweight/Obesity	Pre–post evaluation; CBPR	PLP's 3-month culturally adapted DPP-LI phase	Significant overall ($n = 343$) improvements in mean weight loss (–1.4 kg ±3.41), BMI

(*continued*)

Table 1. Continued

Source	Participants	Target condition	Design	Intervention	Key findings
					(−0.51 ± 1.23), SBP (−3.89 ± 17.19), DBP (−2.36 ± 11.38), physical functioning 6 minute walk test (111.54 ± 277.99), fat in diet scores and physical activity level were achieved at 3-month follow-up.
Kaholokula et al. (2016)	240 NHOPI adults with BMI ≥ 25	Overweight/Obesity	RCT; CBPR		Participants of both PLP groups who lost ≥3% at start of WLM efforts were significantly ($p < 0.05$) more likely to lose ≥5% at 12- (44% for GS; 56% for DVD) and 18-month follow-up (57% for GS; 43% for DVD) than those who started at <3% initial weight loss. There was no significant difference amongst the control participants in their continued weight-loss efforts between those who lost ≥3% vs those who lost <3%.
Kaholokula, Look, Wills, et al. (2017)	55 NHOPI adults with uncontrolled hypertension (SBP ≥ 140 mmHg) • NH 49% • OPI 46% • Other 5%	Hypertension	RCT with waitlist control; CBPR	Ola Hou i ka Hula programme ($n = 27$) vs waitlist control ($n = 28$)	Significant differences found between participants of the hula programme (Ola Hou i ka Hula) and those in the waitlist control group in SBP improvements (−18.3 vs −7.6 mmHg, respectively; $p \leq 0.05$) from baseline to 3-month follow-up. Improvements in the health-related quality-of-life measures of bodily pain and social functioning were significantly associated with SBP improvements in both groups.

CA: culturally adapted; CBPR: community-based participatory research; RCT: randomised controlled trial; DPP-LI: Diabetes Prevention Program-Lifestyle Intervention; PLP: PILI Lifestyle Intervention; WLM: weight loss maintenance; PIC: Partner's in Care; SBG: standard behavioural follow-up group; SSG: social support group. For Filipino participants, a BMI ≥ 23 was used to determine overweight status for studies that include this sub-population.

groups), in all aspects of the research; that is, from conceptualisation to dissemination (Minkler & Wallerstein, 2011). Researchers often define 'community' by race/ethnicity, religious or sexual orientation, acculturation and socioeconomic status and geographic locale. CBPR has been used extensively as a research approach with NHPI communities to address a range of infectious and chronic diseases (Braun et al., 2008; Nacapoy et al., 2008; Aitaoto et al., 2015; Chung-Do et al., 2016; Dela Cruz et al., 2016).

CBPR is well suited as a research approach to the cultural adaptation of existing EBI (Jumper-Reeves et al., 2014) and to developing novel culturally grounded interventions (Walters et al. in press). Qualitative approaches to solicit cultural expertise for the adaptation of an EBI have been used in NHPI communities, such as the use of focus groups with community members, informant interviews with community leaders and health professionals (e.g. elders and gatekeepers) and 'windshield tours' of the community infrastructure and resources (Mau et al., 2010). Culturally grounded approaches for intervention development are more challenging because of the intimate cultural knowledge and community involvement needed to design such interventions from the 'ground up'. It may require participation by cultural experts as the interventionists (vs informants) because of their particular cultural knowledge and credibility. In the subsequent sections, we describe the process and outcomes of culturally adapting EBIs (PILI 'Ohana Project) to address obesity and diabetes and the development of an intervention from the 'ground up' to reduce CVD risk (KāHOLO Project) in NHPI communities using a CBPR approach.

The PILI 'Ohana project: partnerships to overcome obesity disparities

Project background

The PILI 'Ohana Project (POP) is a long-standing CBPR initiative to address obesity and diabetes disparities in NHPI communities in Hawai'i. The POP was funded consecutively for 11-years (2005–2016) by the National Institute of Minority Health and Health Disparities (NIMHD) of the National Institutes of Health (NIH). The partnership was originally formed by community leaders and academics from the following non-profit organisations: (1) Hawai'i Maoli of the Association of Hawaiian Civic Clubs, serving a confederation of 62 clubs across Hawai'i and the continental US; (2) Kula no na Po'e Hawai'i (KULA), serving the education and health needs of the Hawaiian Homestead communities of Papakōlea, Kewalo and Kalāwahine; (3) Ke Ola Mamo, a Native Hawaiian Health Care System for the island of O'ahu providing health services to primarily low income Native Hawaiians; (4) Kōkua Kalihi Valley Comprehensive Family Services (KKV) providing health services to immigrant Pacific Islanders and Asians; (5) Kalihi-Pālama Health Centre, a health clinic also serving predominately Pacific Islanders and Asians; and (6) Department of Native Hawaiian Health in the John A. Burns School of Medicine, a clinical department focusing on health disparities in NHPI. For more details about the POP partnership, see Kaholokula, Kekauoha, et al. (2014) and Nacapoy et al. (2008).

Key steps to cultural adaptation and intervention development

Establishing an equitable research environment

Prior to conducting any research, the POP developed a CBPR governance infrastructure overseen by two co-directors, one co-director representing the community and the other representing the academic interests and perspectives, and governed by a Project Steering Committee (PSC) comprising all of the community and academic partners. All members had shared decision-making authority, equal access to financial resources and met monthly to oversee the projects and its resources. The POP partnership developed and codified the principles and guidelines for overall governance in a document, which described the partnership's mission and purpose, partners' roles and responsibilities, decision-making processes and data ownership.

With the CBPR governance and infrastructure in place, the POP integrated community wisdom with the scientific method to culturally adapt and test two evidence-based interventions for NHPI communities: (1) the *PILI Lifestyle Program* based on the DPP-LI and (2) *Partners in Care*, a diabetes self-management intervention that integrates the American Diabetes Association (ADA) standards of care into a culturally responsive education intervention.

Formative data collection to inform intervention adaptation

The community-based researchers first conducted community-wide assessments of their respective communities (i.e. catchment area or neighbourhood) served by each of the five original participating CBOs to inform the adaptation of the DPP-LI. Consistent with the intent of CBPR in building community capacity, the community partners themselves conducted all assessments with training and assistance from the academic partners. From the perspectives of NHPI living, and health professionals working, in these communities, the assessment goals were to identify (1) facilitators and challenges to achieving and maintaining a healthy lifestyle, (2) practical health promoting strategies, and (3) existing community resources that could be incorporated into, or help facilitate, a lifestyle intervention.

Face-to-face qualitative data collection methods, such as focus groups and informant interviews, were used primarily because they allow for open-ended questioning and for respondents to share information in their own words. They are important in gathering information needed for adapting existing interventions to a new cultural context while also respecting the preferred information-sharing method of NHPI. They allow the respondent to gauge the intentions of the interviewer and develop rapport. These data collection methods are particularly important here because NHPI often prefer a 'talk story' format (i.e. free-flowing information sharing through story telling) consistent with their oral traditions of relaying information in the context of their own lived experiences. It also allows the respondent to determine what they want to share, at the pace they want to share it and to what degree.

A series of focus groups were convened with 112 Native Hawaiians, Samoans, Chuukese and Filipinos to elicit their perspectives and ideas. Informant interviews were conducted with 15 community leaders and health professionals working with NHPI and 206 mail-out surveys of NHPI households were returned of the 500 mailed out to obtain a broader representation of perspectives (Mau et al., 2010). The results of these assessments were aggregated to formulate a multilevel, socioecological conceptual framework specific to NHPI to guide intervention development and adaptation going forward.

Figure 1 depicts the socioecological model and the key common factors identified across Pacific Islander groups at the individual, family and community level, adapted here from Kaholokula, Kekauoha, et al. (2014). At the individual level, self-efficacy (i.e. a person's belief in his or her ability to succeed in specific situations or accomplish a task), assertiveness (i.e. ability to state one's preference to others), past weight loss attempts (i.e. frustration with inability to maintain weight loss efforts), weight loss expectations and stress management were identified as common issues for NHPI. At the family level, economic and family stressors were identified as major challenges to practicing a healthy lifestyle, such as affording healthier foods and securing childcare while exercising. At the larger social and community level, the safety of neighbourhoods, the availability of healthy food options and physical activity venues, and having community role models were factors related to supporting a healthy lifestyle. The availability of culturally relevant forms of physical activity (e.g. hula and ballroom dancing) and managing cultural expectations regarding eating were culture-related factors either supporting

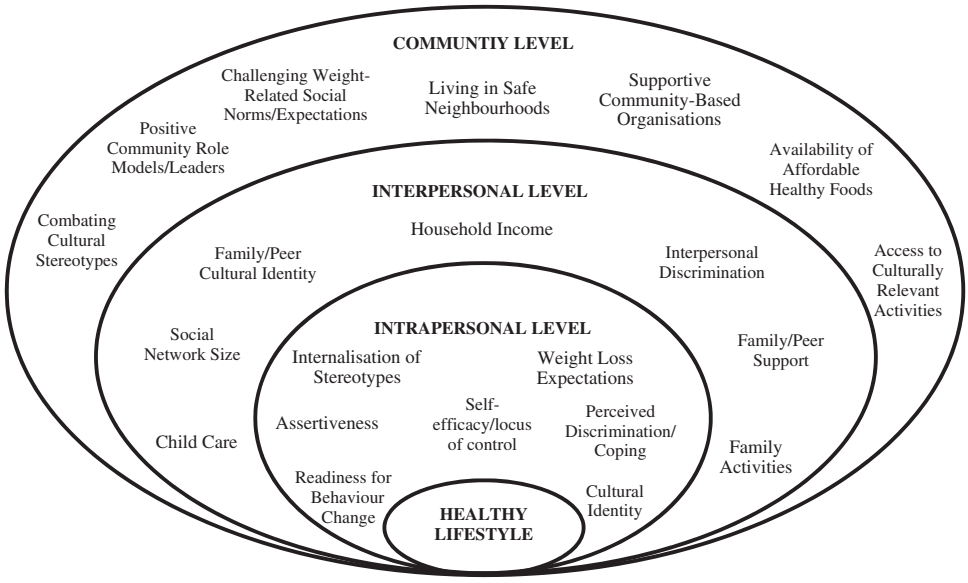


Figure 1. Socioecological model for Health Promotion in NHOPI communities modified from Kaholokula, Kekauoha, et al. (2014).

or hindering (e.g. larger portion size expectation) the adoption and maintenance of a healthy lifestyle.

Cultural adaptation process

In addition to the community assessments, the community partners of the POP and their staff also reviewed the DPP-LI core curriculum and materials. Based on data from the community assessments and their cultural lens, they provided input to where surface and deep structure modifications should be made to the curriculum foci and materials. The original DPP-LI lessons covered topics and behavioural strategies/activities (e.g. portion control, self-monitoring and goal setting) to lower dietary fat and caloric intake, to increase daily physical activity (e.g. 30 min/day for 5 days/per week of moderate aerobic exercise such as brisk walking or biking), to manage stress and time for a healthy lifestyle, and to deal with challenging social situations. The core curriculum was informed by the social cognitive theory of behaviour change (Diabetes Prevention Program Research Group, 2002).

Surface structure modifications to the DPP-LI included the use of pictures/images familiar to NHPI and words/idioms and food examples specific to NHPI communities, as well as those common to local Hawai'i culture. Deep structural changes involved modifications to how the lessons should be delivered (e.g. in groups rather than individually) and by whom (i.e. community peer educators), as well as expanding aspects of the core curriculum to a family and community focused adjunct weight-loss maintenance component. In order to make room for a family and community focused component to the DPP-LI, the community partners reduced the original 16 DPP-LI lessons to eight lessons, but maintained all the original topics, strategies and foci (i.e. the core components). Two additional topics important to the community partners were added to the adapted DPP-LI, which focused on the economics of healthy eating (i.e. how to eat healthily within your budget) and talking with your doctor (i.e. communicating effectively with your healthcare provider). Kaholokula, Wilson, et al. (2014) provide a summary of the adapted DPP-LI curriculum and its comparison to the original DPP-LI curriculum.

The family and community focused component extended the DPP-LI topics and activities to the family and community environment with the individual participants as the agents of change. The rationale for this component was that the maintenance of long-term weight loss requires a supportive family and community environment, as indicated from the community assessments. Studies have demonstrated the importance of a person's social and community environment in influencing his or her lifestyle behaviours (Baranowski et al., 2003). As a weight-loss maintenance component to the culturally adapted DPP-LI, the family and community level factors identified from the community assessments were added into the curriculum. The family and community focused component aimed to help participants elicit support from their friends and family, increase family activities around eating and being active, manage challenging social situations, effectively communicate one's healthy lifestyle goals and identify and utilise community resources (e.g. parks and farmers markets). Kaholokula, Mau, et al. (2012) provide a summary of the family and community curriculum.

PILI lifestyle programme

Characteristics of the developed intervention

The adapted DPP-LI and the family and community adjunct component, combined, was named the *PILI Lifestyle Program* (PLP), consisting of two phases. The first phase was the adapted DPP-LI delivered in eight lessons over 3 months covering topics on healthy eating, staying active and managing stress and difficult social situations (e.g. baby 1st birthday and graduation celebrations) to initiate weight loss. The second phase was the family and community component for weight-loss maintenance developed for pilot testing to consist of six sessions delivered over 6 months. This phase was lengthened in later iterations to 15 and 9 months in

additional community and worksite-based implementation, respectively. All lessons were accompanied by a participant workbook or handouts. The participants were supported by a community peer educator in goal setting and developing an action plan to meet their personal healthy lifestyle goals and those of their family. The weight loss goal of the PLP was a modest 3% (for pilot testing) to 5%. In addition to weight loss and other clinical outcomes, the community investigators also believed it was important to focus on improving physical functioning because of its impact on other aspects of quality-of-life (i.e. social functioning). The PLP materials can be viewed and downloaded at http://www2.jabsom.hawaii.edu/pili/.

Having the PLP delivered by NHPI community peer educators was part of the pursuit to develop a culturally responsive intervention and to enhance community capacity for sustainability. Studies have shown that community peer educators are as effective as health professionals (e.g. nurses and social workers) in delivering a lifestyle intervention to include the DPP-LI (Ali et al., 2012). Community peer educators are better able to provide the sociocultural context for an intervention curriculum to ensure relevance and applicability and to serve as relatable role models for community participants. They are part of the community and, in many cases, know the participants and their families intimately.

Outcome studies of the PILI lifestyle programme

The adapted DPP-LI phase of the PLP was first pilot tested in the five partnering CBOs with 169 NHPI participants with excess body weight (Body mass index [BMI] $\geq$ 25 or $\geq$23 for Filipinos), of which 52% were NH, 27% Chuukese, 12% Samoan, 5% Filipino and 3% Other Pacific Islander/Non-NHPI (Mau et al., 2010). Pre- and post-3-month intervention assessments indicated significant weight loss and improvements in systolic and diastolic blood pressure, physical functioning, exercise frequency and dietary fat consumption. Table 2 provides the data for the key clinical and behavioural outcomes in the first column. Furthermore, weight loss was significantly higher among NHPI participants who completed all lessons in the PLP weight-loss phase (–1.8 kg) compared to those who did not (–0.70 kg).

Since the initial testing, the adapted DPP-LI phase of PLP has been examined in other studies to address excess body weight to include another community-based sample of 239 NHPI (Kaholokula, Kekauoha, et al., 2014), a sample of 217 employees (majority NHPI) as part of a worksite lifestyle intervention called PILI@Work (Townsend et al., 2016) and a sample of 343 NH who were part of a dissemination project across Hawai'i (Delafield et al., 2016a). With the exception of a few sites that used health professionals (e.g. psychology interns and nutritionists), trained community or worksite peer educators, for the most part, delivered the intervention in groups ranging from eight to 20 and in their respective CBO sites or worksites. Table 2 summarises the key outcome data across these different studies regarding the 3-month adapted DPP-LI. Significant pre–post weight loss was achieved, ranging from –1.7 kg to –1.2 kg. There were also significant improvements in systolic and diastolic blood pressure, physical functioning, exercise frequency and dietary fat consumption. Within each study, there were differences across CBO sites (or worksites) in the degree of improvements in these outcomes (data not shown in Table). The CBOs with predominately NH participants (compared to heterogeneous groups of PI participants) and the intervention groups that were ethnically homogenous (i.e. all participants of the same Pacific Islander ancestry) had greater weight loss (Kaholokula, Wilson, et al., 2014). These findings speak to the importance of ethnic specific sociocultural support and context for positive behaviour change.

To test the weight-loss maintenance efficacy of the 6-month family and community phase of the PLP, 144 NHPI who completed the adapted DPP-LI in the original study (Mau et al., 2010) and were willing to continue on, were randomised to either receive the PLP family and community intervention ($n = 72$) or to a standard behavioural follow-up ($n = 72$) (Kaholokula, Mau, et al., 2012). The latter included once-a-month phone calls and mailers to follow-up with participants on the adapted DPP-LI lessons and as a check-in. Among the participants who completed at least three of the six PLP lessons, they were 5.1-fold more likely to have maintained their initial weight loss than those of the standard follow-up group ($n = 72$). Again, the finding of attending and receiving all lessons as prescribed in increasing weight loss success speaks to the importance of dose effects in behavioural interventions (Greaves et al., 2011).

In a subsequent study, the 6-month family and community component of the PLP was expanded to 15 months with 17 lessons in total to increase its focus on the social environment (Kaholokula et al., 2016). After completing the adapted DPP-LI component, participants ($n = 239$) were randomised to either receive this 15-month intervention in groups delivered

Table 2. Three-month changes in key clinical and behavioural measures after completing the adapted DPP-LI across studies with NHOPI.

Outcome measures	Pilot study[a] ($n = 169$) $M \pm SD$	Intervention study[b] ($n = 239$) $M \pm SD$	Worksite study[c] ($n = 217$) $M \pm SD$	Implementation study[d] ($n = 343$) $M \pm SD$	Average across studies $M \pm SD$
Weight (kg)	–1.5 ± 3.5	–1.7 ± 3.5	–1.2 ± 2.6	–1.4 ± 3.4	–1.5 ± 3.3
BMI	–0.58 ± 1.4	–0.6 ± 1.3	–0.45 ± 1.0	–0.5 ± 1.2	–0.53 ± 1.2
Systolic BP (mmHg)	–6.0 ± 18.0	–3.3 ± 18.6	–2.8 ± 12.5	–3.9 ± 17.2	–4.0 ± 16.8
Diastolic BP (mmHg)	–2.8 ± 11.0	–3.4 ± 12.5	–2.01 ± 8.1	–2.4 ± 11.4	–2.7 ± 10.7
6 minute Walk Test (ft)	42.0 ± 124.0	106.6 ± 238.4	74.7 ± 154.7	111.5 ± 278.0	83.7 ± 198.8

Note: All measures across all studies are statistically significant pre–post improvements at $p < 0.01$.
[a]Mau et al. (2010).
[b]Kaholokula, Wilson, et al. (2014).
[c]Townsend et al. (2016).
[d]Delafield et al. (2016a).

by a community peer educator, or to receive the same intervention individually delivered by DVD technology or to a control group. The control group received monthly mailers (15 mailers over the 15-months) with educational information on healthy living (e.g. benefits of a healthy diet, physical activity and time management). The DVD version was developed to address the challenge of many NHPI participants in being able to make fixed face-to-face lessons at pre-specified times because of shift work or other work-related issues. The results showed no significant differences amongst the two intervention groups and control group in weight-loss maintenance at 12 and 18 months from starting weight loss efforts (i.e. baseline). Participants of the control group were just as likely to have maintained their initial weight loss compared to those who received the intervention, regardless of delivery mode. However, greater weight loss during the 3-month adapted DPP-LI phase predicted significantly greater weight loss at both 12- and 18-month follow-up for all participants. A bulk of the weight loss actually occurred during the adapted DPP-LI phase. Other studies have also shown the importance of early weight loss success for longer-term weight loss maintenance (Thomas et al., 2015; Unick et al., 2015).

The family and community component of the PLP was adapted to a 9-month version as a worksite-based intervention to be inclusive of the influence of co-workers and the work environment. After completing the 3-month adapted DPP-LI, worksite cohorts ($n = 22$ from 15 different worksites) were randomised to receive the intervention either from a worksite-peer educator in a group setting or by DVD technology individually (or with other co-workers). Of the 217 participants across all 15 worksites who completed the adapted DPP-LI, 83 received the face-to-face version and 73 received the DVD version (Ing et al., in press). As in the previous POP intervention study, results showed no significant difference between the two intervention groups in continued weight loss or weight loss maintenance. Attendance during the 3-month adapted DPP-LI and higher baseline systolic blood pressure were both significantly associated with increased percentage weight loss at 12-month follow-up.

When considering the combined effects of both phases of the PLP, it was found that 51% of NHPI who received the 9-month version of PLP (i.e. 3-month adapted DPP-LI plus 6-month family/community phase) lost 3% or greater of their initial body weight compared to 31.4% of those who received the 3-month adapted DPP-LI combined with the 6-month standard behavioural follow-up (Kaholokula et al., 2013). For NHPI in both groups, greater 3-month weight loss significantly increased the likelihood of reaching 3% or greater weight loss at the 9-month follow-up. Furthermore, Chuukese participants were more likely to achieve $\geq$3% weight loss at 9 months than Native Hawaiians and other Pacific Islanders. Although not specifically examined, the greater weight loss of Chuukese participants might be related to the close-knit nature of this group, being recent immigrants to Hawai'i who rely on each other for economic and social support. The community peer educators did observe that they would engage in group-related activities with other participants outside of the intervention lessons.

Summary of the PILI lifestyle programme

Findings from the PLP studies reviewed here show that significant, albeit modest, weight loss and improvements in other clinical and behavioural factors related to body weight among NHPI are achievable with a culturally adapted EBI aimed at lifestyle behaviours. NHPI who lost more weight early on in the intervention were more likely to achieve longer-term weight loss and weight-loss maintenance success, which was a consistent finding across several studies. Aside from early weight loss success, other factors were also found to be significant correlates of weight loss in NHPI. For example, Townsend et al. (2016) found that improvements in the locus of weight control (toward internal locus), physical activity and perception of community support were associated with 3-month weight loss. However, Townsend et al. (2014) found that eating self-efficacy level at baseline was associated with 12-month weight loss. The focus of future studies with NHPI should be on developing strategies to achieve greater weight loss sooner (i.e. first 3 months) in a lifestyle intervention for NHPI with excess body weight—perhaps by addressing the locus of weight control and eating self-efficacy early on in an intervention to increase long-term motivation.

In further understanding the significance of these findings, it is important to note that the PLP, for the most part, was delivered by lay community members with no prior experience in health promotion and to a NHPI population that were mostly in the severe obesity range (BMI >35), an often difficult population to reach. Studies of the original DPP-LI found that every kilogram of excess body weight a person loses reduces his or her risk for diabetes by 16% (Hamman et al., 2006). It was the original intent of the POP partnership to make the PLP a low-to-moderate intensity lifestyle intervention to increase its reach and sustainability across different community settings with limited resources. Thus, PLP offers the promise of improving obesity and its related chronic diseases in NHPI populations.

Partners in care: a diabetes self-care intervention

Partners in Care, the second EBI culturally adapted by POP, was designed as a community-based behaviour change intervention for NHPI that integrates the ADA standards of care into culturally responsive diabetes self-management education to promote self-care activities. Partners in Care includes a curriculum that promotes healthy eating and physical activity, glucose monitoring, social support and medication adherence, with an overall goal of improving blood sugar levels as measured by a haemoglobin A1C (A1C) test to reduce and/or prevent diabetes-related complications (Sinclair et al., 2013).

Formative data collection

The Partners in Care curriculum was previously designed and evaluated with Native Americans in the Southwest (Gilliland et al., 2002) and African Americans and Latinos in Detroit (Two Feathers et al., 2005a, 2005b). Prior studies with these populations resulted in statistically significant improvements

in A1C using a quasi-experimental design to test its effectiveness. To adapt the intervention for NHPI, four focus groups were conducted with 38 community members served by four of the participating CBOs of POP. The purpose of the focus groups was to identify factors that both facilitate and impede self-management of diabetes; knowledge of diabetes-related complications and prevention; interest in a group-based educational intervention; and views about who should deliver the intervention.

Major focus group themes that emerged included difficulties in adhering to a healthy diet and physical activity regimen to control blood sugar, side-effects of diabetes medications, prevention of diabetes-related complications, how to better communicate with healthcare providers and family and friends, how stress affects blood glucose control and how to interpret HbA1C results. Many of these topics were similar to those reported by the other populations and, thus, were already included in the curriculum. Therefore, minimal adaptations were required for the self-management recommendations and behaviour change strategies. The PSC members and community peer educators from the participating communities who were trained to deliver the intervention also contributed local and cultural knowledge during adaptation by reviewing written materials and making suggestions for visuals and hands-on activities.

Cultural adaptation process

Both surface and deep structure modifications were made to the curriculum. Images of Hawai'i, local foods, physical activities and NHPI persons were included to convey relevance to participants. Peer educators used 'local' language, analogies and examples to convey some of the educational content. By using a culturally relevant context to discuss behaviour change, the information about diabetes self-management becomes more meaningful for the participants (Kreuter et al., 2003). These sociocultural strategies presented diabetes in the context of cultural values and characteristics of the participants and were incorporated into the intervention to increase salience. For example, a story depicting local characters at the beginning of each lesson helped to reinforce the tradition of families and communities working together and facilitated the sharing of participants' personal stories of diabetes and its management. Storytelling allowed the peer educators to use metaphors to link the participant's situation to effective self-management behaviours. For centuries, preliterate Pacific Islanders have told stories to transmit information, share histories, and teach important lessons and this continues to be a preferred form of communication among many NHPI today referred to as 'talk story'. Research findings suggest that a person's brain naturally seeks out a coherent narrative structure in the stories we hear and tell. This structure helps individuals absorb the information in a story, and connect it with their own experiences in the world (Green et al., 2002; Green, 2004). At the end of each Partners in Care lesson, participants were asked to set a goal that was related to the topic of the lesson. The peer educator devoted time for participants to discuss successes and challenges to achieving their goals at each subsequent meeting.

Characteristics of adapted partners in care

Curriculum materials emphasised American Diabetes Association clinical guideline goals for blood glucose (as measured by A1C), blood pressure and cholesterol management (American Diabetes Association, 2013). Social cognitive theory provided the conceptual foundation for Partners in Care, with an emphasis on self-efficacy, emotional coping response, behavioural capability and self-control procedures. Social cognitive theory constructs (Bandura, 1986; Baranowski et al., 1997) were combined with values, norms, cultural symbols and themes and relationships to promote self-care activities. In total, Partners in Care included 12 lessons delivered over 12 weeks.

Outcome studies of adapted partners in care

To evaluate Partners in Care with NHPI, a randomised controlled trial design was used in which 48 participants were assigned to the Partners in Care intervention and 34 to a waitlist control group (Sinclair et al., 2013). Partners in Care was superior to waitlist control in improving A1C at 3-month follow-up based on both an intent-to-treat (–1.1 vs –0.3) and complete case analyses (–1.6 vs –0.3). Additionally, Partners in Care participants significantly improved their understanding of diabetes and performing diabetes self-management compared to the waitlist control group. In post-intervention surveys, 97% reported high satisfaction with the curriculum and activities and 91% reported that the classes and materials were useful, applicable and culturally appropriate. Participants also appreciated the peer educators and reported that group classes provided an opportunity for social support.

To explore the impact of social support on the maintenance of Partners in Care outcomes, a subsequent study examined the effects of a diabetes-specific social support group delivered after completion of Partners in Care compared to a control group that only received Partners in Care (Ing et al., 2016). Participants ($n = 47$) first completed the 3-month Partners in Care and then were randomised to either a 3-month, 6-session social support group ($n = 25$) or a control group ($n = 22$). At 3-month assessment, receiving the Partners in Care intervention led to significant decreases in A1C and increases in diabetes-related self-management knowledge and behaviours. However, there were no significant differences in A1C between the social support group and control group from 3-month to 6-month follow-up. Participants in the social support group had a significant decrease in their mean systolic blood pressure from 3-month to 6-month assessment, while the control group did not.

Summary of partners in care

The Partners in Care study demonstrated that an appropriately designed, community-based intervention requiring little technology and few healthcare resources could have positive effects on self-care behaviours and glycemic control among NHPI with type 2 diabetes. If the significant improvement in glycemic control (e.g. 1% reduction in HbA1c) can be sustained, the Partners in Care intervention has the potential to

reduce microvascular (e.g. diabetic neuropathy) and macrovascular complications (e.g. CVD) and healthcare utilisation costs (United Kingdom Prospective Diabetes Study Group, 1998; Wagner et al., 2001; Stettler et al., 2006). With the high prevalence of diabetes-related morbidity and mortality among NHPI, a significant need exists for improvement in methods of reaching people with diabetes that are culturally responsive and have been systematically developed, implemented and evaluated.

The KāHOLO project: preventing cardiovascular disease

Background

The KāHOLO Project builds on a decade of collaboration between NH communities, NH cultural experts and biomedical scientists to understand how *hula*, the indigenous dance of NH, can be used as a culturally grounded intervention to address CVD (Kaholokula, Look, Wills, et al. 2017). The KāHOLO Project is a 5-year study funded by the National Heart, Lung and Blood Institute (NHLBI) of NIH to evaluate the efficacy of a hula-based intervention on systolic blood pressure (SBP) to reduce CVD risk in NH with poorly managed hypertension and to elucidate the underlying sociocultural and psychosocial mechanism underlying these improvements. In subsequent sections, the preliminary work and studies that led to the KāHOLO Project will be reviewed to exemplify steps undertaken to develop a culturally grounded approach to health promotion programmes for NHPI.

Key steps to developing a cultural grounded intervention

Cultural grounding process and rationale

In many traditional Pacific Islander cultures, including NH, dance is used to visually convey and recount their oral tradition, epic tales, historical events and connection to the natural world (Kaeppler, 1993; Stillman, 1998). Hula continues to be practiced by NH as a form of cultural and creative expression that reconnects them with their native language, values, history and ancestral lands. Often misperceived solely as entertainment for tourists, it is the most prolific of all NH cultural practices performed by men and women of all ages and other people from diverse ethnicities. Presentations of hula are often included in community gatherings, school events, family get-togethers, as well as festivals and theatric performances. *Kumu hula* (hula experts) are the educators and guardians of the hula tradition recognised as important cultural resources. While hula can be taught within families or through casual lessons, formal training is undertaken through numerous *hālau hula* (hula schools), where hula and cultural education, including NH language and traditional protocols and practices, are perpetuated.

A decade ago, in response to the priority placed on CVD research by NHPI community leaders, scientists from the University of Hawai'i and the cultural practitioners of hula formed a CBPR partnership to develop and evaluate a cardiac rehabilitation programme based on hula (Look et al., 2012). Because this was the first time hula was used as part of a biomedical research study, it was critical to establish how this dance form should be utilised in a health intervention that was both culturally appropriate and clinically relevant. The research team purposely included members with a background in both biomedical research and hula. Mixed-method studies were performed to gather community and cultural perspectives and the clinical applicability of hula as a health promotion strategy. These foundational studies included informant interviews with six prominent kumu hula and focus groups with 17 NHPI with CVD to assess acceptability and collect cultural insights on utilising hula in a CVD intervention (Look et al., 2012, 2014). The results across these groups were consistent in that hula was believed to have significant health benefits beyond simply as a form of physical activity. Hula was seen as a means to preserve a strong NH identity and to overall wellbeing because it was seen as promoting emotional, social and spiritual wellbeing through its focus on language, cultural values and connection to other persons and the natural world.

Most important to the development of a culturally grounded intervention, such as hula as a cultural practice, is the active involvement of cultural experts. In this case, the kumu hula community needed to be actively engaged and incorporated as part of the research team to ensure cultural fidelity and acceptability through all stages of development and testing. Kumu hula Māpuana de Silva of *Hālau Mōhala 'Ilima*, a renowned school of hula and cultural arts, served as the study's cultural expert who participated in all aspects of development from conceptualisation to the various stages of its development and testing. She assisted in standardising the hula training while ensuring its cultural integrity (de Silva et al., 2017). Another noted kumu hula, Cy Bridges, served on the external scientific advisory committee to provide an objective perspective of the use of hula for health promotion and to also ensure cultural integrity.

Cultural practice and science integration

To test the benefits of hula as a physical activity, a metabolic equivalence test (MET) of hula was conducted to determine its physical activity benefits. Nineteen elite hula dancers were recruited to determine the MET values for various forms, intensities and styles of hula measured with a portable indirect calorimetry device (Usagawa et al., 2013). It was found that the mean MET were 5.7 (range 3.17–9.77) and 7.55 (range 4.43–12.0) for low-intensity and high-intensity hula, respectively, which met national guidelines for recommended exercise levels.

Based on these initial studies and under the cultural leadership of kumu hula de Silva, the hula intervention called *Ola Hou i ka Hula* (restoring health through hula; referred to as Ola Hou from here on), was developed as a 12-week programme consisting of two 60-minute hula training sessions per week and 3 hours of hypertension education. The hula classes were led by a kumu hula that received training on research requirements, maintaining cultural integrity of the hula lessons and health safety awareness (i.e. hydration). The

hypertension education curriculum was delivered over six 30-minute sessions immediately after the 60-minute hula sessions from week 2 through week 7 adapted from previously developed materials from a heart failure study of NHPI (Mau et al., 2014). The curriculum included four modules: (1) signs and symptoms of hypertension; (2) managing medication; (3) heart healthy eating to include sodium reduction; and (4) physical activity and managing negative emotions. Community peer educators led the education sessions and brief interactive activities, such as cooking demonstrations of healthy recipes of NHPI ethnic foods and practicing of self-monitoring and stress management strategies.

Initial outcomes study of Ola Hou i ka Hula

Although conceptualised originally as a cardiac rehabilitation programme, the idea of using hula for health promotion was applied to hypertension management for NHPI (Kaholokula, Look, Mabellos, et al., 2017). Two of the POP original community partners, KKV and KULA, participated in a pilot study to test the feasibility and initial efficacy of Ola Hou in improving SBP management in NHPI with poorly controlled hypertension (SBP $\geq$140 mmHg). Community peer educators recruited and enrolled 55 NHPI (i.e. Native Hawaiians and Chuukese) who were randomised within each of the two CBO sites to either receive Ola Hou i ka Hula ($n = 27$) or to join a waitlist intervention control group ($n = 28$). Kumu hula who resided in their communities were recruited to deliver the hula lessons, while community peer educators delivered the education lessons. The findings indicated that participants of the hula intervention significantly reduced their SBP compared to the control group (−18.3 vs −7.6 mmHg, respectively) from baseline to 3-month post-intervention follow-up. In both groups, the improvement in SBP was associated with improvement in reports of bodily pain and social functioning.

Summary of Ola Hou i ka Hula

The findings for the pilot trial of Ola Hou were very promising in showing a significant positive effect on improving SBP in NHPI with hypertension. Although hula is a NH practice, Pacific Islanders of Chuukese descent with hypertension were just as likely to benefit from the hula intervention as were NH. There was no ethnic difference in its effects on SBP reductions. Hula also appeared to resonate with the Chuukese participants as a cultural practice, probably because of shared Pacific Islander values, such as enhancing connectedness to other participants and to the natural world around them. Also worth noting is that perceptions of ethnic discrimination decreased for both NH and Chuukese participants who underwent the intervention. Previous studies have linked perceptions of discrimination to hypertension (Kaholokula et al., 2010) and to indices of physiological stress (Kaholokula, Grandinetti, et al., 2012). A culturally grounded intervention, such as hula, could have more than just clinical benefits but sociocultural benefits as well. The latter benefit is consistent with how NHPI participants of the formative studies conceptualised health and wellbeing as being more than physical/clinical in nature, but also involving social, cultural and spiritual aspects.

A larger clinical trial is currently underway to definitively establish the efficacy of Ola Hou in improving SBP control as well as CVD risk (based on Framingham Risk Scores) in 250 NH adults with poorly managed hypertension as part of the KāHOLO Project. An additional 3-month maintenance component, based on self-regulation theory, was added to the 3-month Ola Hou programme to improve its long-term effects on SBP control. The underlying sociocultural and psychosocial mechanism by which the intervention works to improve SBP control and reduce CVD risk will also be examined.

Conclusion

NHPI are distinct racial and ethnic populations with unique and rich cultural perspectives, traditions and aspirations that differ from those of Western-European populations, the cultural group for which many EBI for health promotion favour. Both cultural adaptation of existing EBI and the development of culturally grounded interventions are necessary to 'close the gap' in cardiometabolic inequities between NHPI and other ethnic groups across the Pacific and in the Western countries in which they reside. To close this gap, and to improve health promotion efforts, it will take a more deliberate and multidisciplinary approach with active involvement by NHPI communities at all stages of development and testing, as illustrated by the health interventions reviewed here, the PILI 'Ohana Project and the KāHOLO Project. Also illustrated was how NHPI community peer educators can be very effective in delivering a health intervention in their respective community settings. Although not reviewed in this article, the involvement of NHPI communities from the beginning, and in the intervention delivery itself, is also critical to expedite the dissemination and implementation of these interventions into CBO serving NHPI (Delafield et al., 2016b).

As a summary of the key strategies and lessons learned from the two projects reviewed here, the following recommendations to cultural adaptation and culturally grounded approaches for NHPI communities are provided.

- A CBPR approach, based on stakeholder engagement and participation across all phases of research (from conceptualisation to implementation and evaluation), as investigators and advisors, is necessary to effectively develop and test the efficacy of adapted EBI and interventions developed from the ground up.
- For cultural adaptation of EBI, the core curriculum should undergo deep-structure modifications, in addition to surface structure modifications, to be truly culturally responsive.
- Formative research using qualitative approaches (i.e. focus groups and semi-structured interviews) to gather information for intervention adaptation or design is necessary for gleaning the cultural values, practices and other contextual factors that facilitate health promotion; how they can be incorporated into or adapted for an intervention; and how to best deliver and evaluate the intervention. These

data collection methods are also congruent with the preferred method of information sharing of Native Hawaiians and Pacific Islanders as well as an opportunity for relationship building.

- In addition to, or in the absence of, relevant published literature, formative research can also assist in developing a conceptual model to guide intervention development (e.g. foci and behavioural strategies) and evaluation (e.g. potential mediators and moderators of the intervention and desired outcomes). The evaluation plan should also consider measuring factors important to Native Hawaiian and Pacific Islander communities.
- Native Hawaiians and Pacific Islanders are culturally diverse and 'one size' may not fit all. An intervention can include cultural elements common to multiple Pacific groups or be Pacific group-specific. For the former case, it is important to identify and incorporate these common cultural elements in an intervention and evaluate how the different Pacific Islander groups respond to the intervention.

Notwithstanding, continued efforts need to be made that are both multidisciplinary and transdisciplinary in nature and based on CBPR approaches to elucidate how human biology interacts with, or is impacted by, societal, environmental and psychological factors that place NHPI at a greater risk for cardiometabolic related diseases. For example, the emerging field of epigenetics (i.e. the study of changes in humans due to modification of gene expression in response to environmental factors) could help to explain the underlying mechanism (e.g. chronic inflammation due to chronic activation of the human stress response) of cardiometabolic disease risk in NHPI (Ko'omoa and Maunakea, 2017). Advances in epigenetics and other areas such as the science involving behaviour change theories relevant to NHPI will likely inform the development of more effective and culturally responsive health promotion strategies and public health policies that target important modifiable biological, behavioural and environmental protective and risk factors. As an ancient Hawaiian proverb states, *'A'ohe pau ka 'ike i ka hālau ho'okahi*, which translates as *Not all knowledge is learned from one school* (Pukui, 1983).

Notes

1. PILI is the Hawaiian word for 'to cling to' or 'to join together' and the acronym for Partnerships to Improve Lifestyle Interventions. 'Ohana is the Hawaiian word for 'family' to include extended relations.
2. KāHOLO is a basic hula footwork and used as an acronym for Hula Optimizing Lifestyle Options.

Acknowledgments

The authors thank the community founders of the PILI 'Ohana Project community and their community organisations: Claire Hughes from Hawai'i Maoli – the Association of Hawaiian Civic Clubs, Donna-Marie Palakiko from Ke Ola Mamo, Puni Kekauoha and Adrienne Dillard from Kula no na Po'e Hawai'i, Sheryl Yoshimura from Kōkua Kalihi Valley, Ann Leake from Kalihi-Pālama Health Center. The authors also thank the academic and community members of the HELA and Ola Hou Pilot Study and their community organisations: Māpuana de Silva from Hālau Mōhala 'Ilima, Todd Seto from the Queen's Medical Center, Thomas Wills from University of Hawai'i Cancer Research Center, Sheryl Yoshimura from Kōkua Kalihi Valley, Cappy Solatorio, Puni Kekauoha, and Adrienne Dillard from Kula no na Po'e Hawai'i and Jessica Nāpua Casson from University of Hawai'i for her assistance in formatting parts of this article.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The POP and KāHOLO Project studies reviewed here were funded by the National Institute of Minority Health and Health Disparities [grant no.'s R24MD001660, U54MD007584 and P20MD000173] and the National Heart, Lung, Blood Institute [grant no. R01HL126577, and the National Cancer Institute [grant no. U54CA153459] of the National Institutes of Health. The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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Discussion Paper

Dose Matters: An Approach to Strengthening Community Health Strategies to Achieve Greater Impact

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August 26, 2015

NATIONAL ACADEMY OF MEDICINE

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ACKNOWLEDGMENTS

The authors would like to recognize and thank those who contributed greatly to the dose concept and publication of this report, including Nicole Lezin of Cole Communications for her contributions to writing and editing as well as our community and evaluation partners and Kaiser Permanente colleagues who provided invaluable feedback as we built the concept and attempted to operationalize it.

ABSTRACT

Dose Matters describes the concept of "population dose"—an approach to strengthening and evaluating the impact of complex multisector, multilevel, place-based initiatives. This discussion paper reports on what is promising about the approach while recognizing the measurement and other challenges that still lie ahead. The concept emerged from ongoing evaluations of Kaiser Permanente's Community Health Initiative investments, conducted by the Center for Community Health and Evaluation (CCHE) at the Group Health Research Institute in collaboration with partners at the University of California.

Following an overview of the Community Health Initiative, this report describes the concept in more detail and explains how it can be used to estimate the population-level impact of a set of related interventions. The estimated impact or dose of an intervention is the product of reach (the number of people touched by the intervention) and strength (the effect size or impact on each person reached). The dose concept can also be used in planning and implementation to yield greater impact.

We hope that *Dose Matters* will introduce the concept of population dose in enough detail that a broad audience of community health researchers, evaluators, practitioners, and planners will be both prepared and eager to apply these analyses and approaches to their own work. Additional guidance is available in the form of an interactive toolkit developed by CCHE and Kaiser Permanente (see the Related Resources box). Together, *Dose Matters* and the toolkit will describe in detail the uses of dose for both evaluators and researchers, who will use the quantitative calculations, and community-based organizations and funders, who will apply the overall concept to strengthen every phase of improving community health outcomes, from planning to implementation to evaluation.

INTRODUCTION

In a neighborhood in one of Kaiser Permanente's regions across the country, children walk or ride their bikes to school, taking advantage of a Safe Routes to School initiative that has helped get kids out of cars and buses and onto sidewalks.

At school, cafeterias and vending machines offer healthier fare—less sugar and fat and more grains, fruits, and vegetables. A districtwide curriculum puts the "physical" back in physical education (PE), adding minutes of activity to each child's daily routine.

At work, the children's parents are taking the stairs and getting a nudge to participate in worksite wellness programs. Around the neighborhood, more farmers' markets are operating year round. Open spaces, safer trails (Figure 1) and parks invite people of all ages to resist the lure of their televisions or computer screens and gather, walk, and play instead.



FIGURE 1 Active transportation infrastructure.

These types of changes have been gaining traction and support for more than a decade, emerging as responses to the obesity epidemic and its toll on the health, economic futures, and well-being of so many Americans. The quest has been not only to improve individual health behaviors by encouraging people to transform unhealthy lifestyles into healthier eating and more active living, but to do so on a scale and significance that yields outcomes at a population level.

Doing so requires much more than individual coaching, support, and the fits and starts of attempts to change behavior—the kinds of interventions that might happen through a doctor's office and help some, but far too few, among those who could potentially benefit. We can achieve lasting behavior change on a larger population scale when healthier choices replace and outnumber unhealthy choices wherever we live, work, learn, pray, and play. That means influencing the policies and environments that surround us and doing so in many dimensions and layers simultaneously.

These multidimensional, communitywide health initiatives go by many names and labels: place based, multisector (e.g., schools, worksites, and neighborhoods), multilevel (e.g., individuals, families, and communities or local, state, and federal), and integrated (across several of these dimensions). Within Kaiser Permanente, as described below, they are at the core of a decade-long Community Health Initiative (CHI) focused on increasing opportunities for healthy eating and safe, active living.

Asking and Answering "What Works?"

Regardless of their scope, nomenclature, or funding source, these multidimensional, communitywide health initiatives are complex: they are complex to implement and even more complex to evaluate. As more planners, researchers, funders, practitioners, and advocates gain experience with these initiatives, the question of "What works?" looms large. Where and how should we invest our scarce community health resources—including not only funding but also the time, energy, and collaborative capital of the many agencies and individuals involved?

Unfortunately, the existing evidence base, although improved over the past decade, still offers limited guidance about what works and under which conditions. In part, this is because the main body of research so far has focused on health promotion and programs rather than on broader environmental and policy interventions. Even when the existing evidence base offers guidance or insights about a particular program or policy, it is typically not generalizable to other locales and portfolios of interventions, limiting its usefulness. The evidence base also offers few clues about the relative impacts of different strategies (Cheadle et al., 2013). Will greater behavioral change be achieved by building new sidewalks, or would it make better sense to improve public parks or focus on improved PE—or other portfolios of interventions? What are the best choices for a community from the possible menu of interventions—or which combinations offer even greater impact, savings, and/or improved health outcomes?

About This Report

Dose Matters describes the concept of "population dose"—a way to overcome some of the challenges inherent in creating and evaluating complex multisector, multilevel, place-based initiatives. As described below, the population dose concept and its application are still a work in progress; *Dose Matters* reports on what seems promising about the approach while recognizing the measurement and other challenges that still lie ahead. The concept emerged from ongoing evaluations of Kaiser Permanente's CHI investments, conducted by the Group Health Cooperative's Center for Community Health and Evaluation in collaboration with partners at the University of California.

Following an overview of the CHI and how it led to the formulation of population dose, this report describes the concept in more detail, explains how it can be used to measure an intervention's (or set of interventions') reach and strength, and reviews the implications for strengthening dose in order to yield greater impact.

We hope that *Dose Matters* will introduce the concept of population dose in enough detail that a broad audience of community health researchers, evaluators, practitioners, and planners will be both prepared and eager to apply these analyses and approaches to their own work. As this occurs, we look forward to collecting even more examples of how dose has been applied in communities and regions across the country, adding to the collective knowledge base about estimated effects and thus making the concept even more useful and applicable over time.

Additional guidance is available in the form of an interactive toolkit developed by the Center for Community Health and Evaluation and Kaiser Permanente. Together, *Dose Matters* and the toolkit should help address questions about the population dose concept and how to operationalize it at several different levels. The quantitative calculations and methods involved in estimating dose can be tricky and may be of greater interest to evaluators and researchers. The evolving quantitative methods are briefly reviewed in this report, but the focus is on the overall concept and how it can be applied to strengthen every phase of improving community health outcomes, from planning to implementation to evaluation.

THE KAISER PERMANENTE/COMMUNITY HEALTH INITIATIVE CONTEXT

Kaiser Permanente, founded in 1945, is America's oldest and largest private nonprofit health care organization. Today, Kaiser Permanente's 240,125 employees and physicians provide health care through 35 medical centers and 431 clinics in nine states and Washington, DC.

Kaiser Permanente's clinical role has always been embedded in broader notions of community health, recognizing that access to medical care, while important, pales in significance when compared to the contributions of behavioral, environmental, and social factors that influence health and wellness. For the past decade, building on a history of similar initiatives, Kaiser Permanente has augmented and expanded its clinical health care role with a focused and ambitious community-based obesity prevention effort: the Community Health Initiative (CHI). CHI is a prevention-driven approach to supporting policies and environmental changes that increase access to nutritious foods, physical activity, economic vitality, safety, and wellness in local schools, workplaces, and neighborhoods. As a multisector, place-based effort, CHI aligns with Kaiser Permanente's broader Total Health strategy—an effort to deploy Kaiser Permanente's health care system, workforce, and business operations in tandem to create health for its members, workforce, and the broader community.

Figure 2 shows CHI's presence across Kaiser Permanente regions, reaching more than 1.1 million people since CHI was launched in 2004. The most substantial and mature initiatives are in Colorado, with 32 CHI sites.

The $50 million invested by CHI to date crosses settings—health care, neighborhoods, schools, and worksites—and supports a variety of strategies, often in combination. These strategies include, for example, environmental changes such as boosting the healthy choices offered in school cafeterias; programs such as worksite wellness offerings; policies such as requiring PE across a school district; and capacity building (e.g., leadership or partnership development, advocacy training, and skills in specific relevant topics such as interpreting data, planning, implementation, and evaluation) that makes these strategies more effective and feasible.

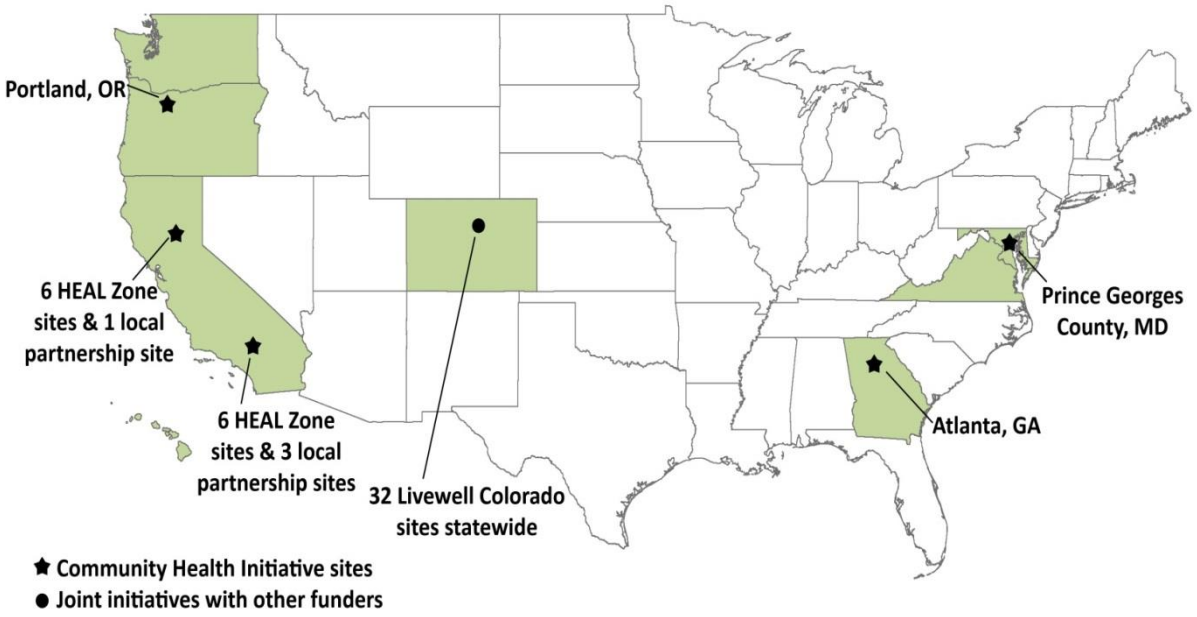


FIGURE 2 Map of CHI sites, 2015.
NOTE: HEAL, Healthy Eating Active Living

When does an activity become a strategy? For CHI's purposes, a strategy is any set of coordinated activities that are designed to lead to a sustainable community change. Each part of this definition is important. The "set of coordinated activities" means the activities have some intention and coordination behind them, even though unplanned events arise that influence these efforts. A "sustainable community change" is a change in community programs, policies, or the environment that supports improved food and physical activity behaviors. These, in turn, could be grouped according to the behavior change being sought (e.g., nutrition or physical activity) or by their potential scope or impact (e.g., hallway signs to encourage taking the stairs versus worksite wellness programs that promote walking clubs at lunchtime)

Figure 3 shows the types of strategies implemented in 35 of the 50 CHI communities for which detailed data were available in early 2014—then constituting at least 600 different strategies.

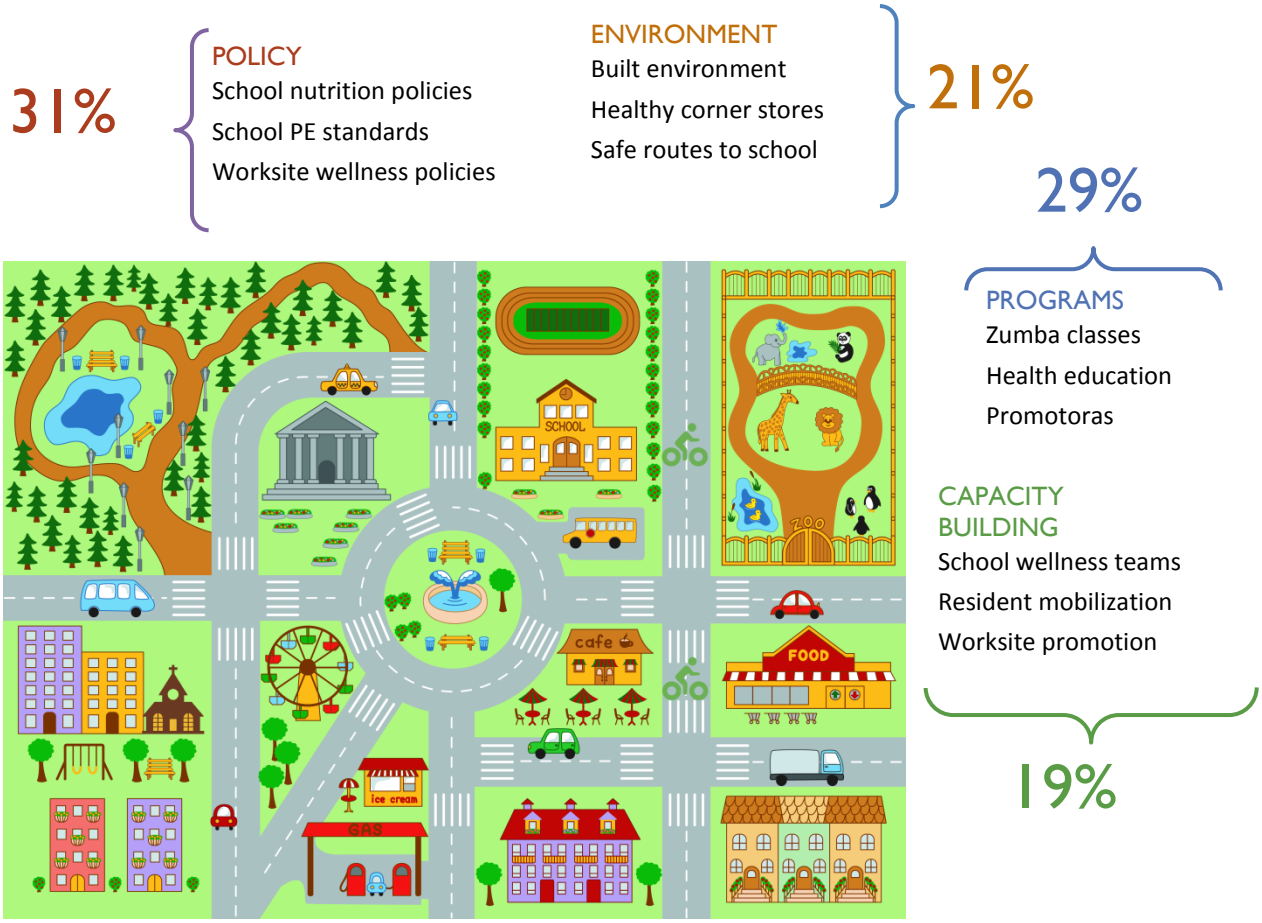


FIGURE 3 Types of strategies implemented in 46 CHI communities, 2015.

CHI EVALUATION AND STRATEGY REFRESH: ORIGINS OF THE DOSE CONCEPT

In 2009, with hundreds of different strategies and combinations of strategies deployed in settings across the country over a 5-year period, it was time to ask: Is CHI making a difference in people's health? Are these strategies, singly or in combination, strong enough to have an effect?

The CHI evaluation was framed by a cross-site logic model, provided in Appendix A. The evaluation focused on intermediate outcomes of how health-promoting system changes affect increases in healthy eating (nutrition) and active living (physical activity). In addition, the evaluation explored the degree to which changes in community capacity occur and support these changes.

With the cross-site logic model as a guide, Kaiser Permanente's CHI team and evaluators designed an ongoing, multi-method evaluation framed by these specific questions:

- Are community food and activity environments changing?
- Are we having an impact on behavior, health status, and community capacity?
- What are we learning to inform program improvement?

The team sought answers to these questions using a combination of methods—key informant interviews, documentation of intervention progress, surveys assessing behavior changes at both the individual and population levels, and Kaiser Permanente member data (e.g., health outcomes such as body mass index.

The preliminary results led to some midcourse adjustments that evolved into the concept of dose, influenced in part by a framework originally set forth by Glasgow et al. (2006) as RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance).

The early CHI assessments suggested that in many cases CHI strategies were not strong enough to have the expected impact. Community food and activity environments were changing, and CHI was having some impact on behaviors, health status, and community capacity. But were CHI strategies consistently strong enough to reach enough people and eventually change people's health throughout a community? Unfortunately, they were not as strong as we had hoped, expected, and would like to see, given the investments of CHI's first 5 years.

Why not? In exploring the differences between CHI strategies that appeared to yield results and those that did not, CHI and its evaluators learned that many interventions were weak, with resources spread too thinly across sites to make a real difference.

What did this mean for the next 5 years and beyond? We realized that we need to touch more people in a given place and that that touch must be strong enough to have a realistic, expected chance to make a difference in behavior—to have an impact. This idea—that there is an amount of "dose" underlying measurable changes and that it is a function of both the number of people touched as well as the strength of that touch—became the concept of "population dose."

This insight about what might explain differences in CHI outcomes affected our ongoing evaluation in several ways. First, it led to changes in our expectations about specific interventions—for Kaiser Permanente as a funder and for our grantees as well. We also developed analytic methods, technical assistance, and evaluation systems that take dose into account, as described in greater detail below. Finally, we recognized that community ownership is important for increasing the chances of sustainable change and long-term impact.

The concept of dose was useful in looking back and understanding what had occurred (and not occurred) as a result of CHI so far. But how do we know how strong a strategy or combination of strategies needs to be in the future to achieve an impact in a given population? How can we prioritize interventions to have the greatest impact?

Answering these questions meant exploring the role of evaluation in the planning and implementation phases of working with CHI communities to build stronger interventions and accelerate our work together. We also had a significant challenge: finding a way to quantify dose so we could capture the complementary nature of multiple intervention "apples and oranges" with a common metric and then use that metric to estimate population health improvement.

In the sections that follow, we explain the concept of population dose in terms of its components (reach and strength) and then explore some potential ways to calculate dose, which is very much a work in progress. These sections are followed by examples of one of the most important implications of dose: how communities can use the concept to build stronger and more effective interventions, no matter where their starting point may be.

POPULATION DOSE: THE CONCEPT

The concept of population dose gives us a way to describe and compare the relative impact of different strategies. A strategy is considered high dose if its implementation results in *many people in the community changing their lifestyles in significant ways*. These components work together to create population dose**,** which is an estimate of the impact of community interventions on an average resident's behavior.

Many People = Reach

The "many people" part can be thought of as reach: the number of people from a particular target population touched by or exposed to an intervention strategy, expressed as a percentage of the target community population. For an example of calculating reach, see Box 1.

To understand the number of people touched by an intervention, we need to be clear about who is and is not included in a target population. In other words, the denominator is key. Defining and understanding the denominator or complete target population gives us options for comparing interventions and for understanding what an "average" resident might experience in terms of exposure to an intervention, because some people will receive or be exposed to an intervention, and some will not.

For example, consider a specific community—whether it is a town, school district, census tract, county, or some other geographically defined place. Now consider all the people living in this community to compare two interventions: an exercise class and a new sidewalk.

Even if the exercise class "reaches" a lot of people, it would still typically be considered a low-reach intervention because the number of people it reaches is expressed *as a percentage of the total community population* (or, in some cases involving children and youth, a school population). As a result, even if dozens or hundreds of people attend the exercise class and benefit from it, the *reach into the total population* is low.

The new sidewalk, on the other hand, could reach many more people *and* a significant proportion of the community, depending on its location and use patterns. Nevertheless, it might

not have a huge impact on each person. In describing and measuring dose, we often have to say, "It depends" for this reason: context, including implementation, is crucial.

BOX 1

Test Your Reach

A nearby elementary school has 300 students—about 10 percent of the community's total of 3,000 elementary school students.

The school's principal decides that all the school's students will get an added recess, increasing their minutes of physical activity by 20 percent each day. The children love it, and the teachers do, too, because the students return to the classroom far more focused and attentive than before.

From this brief description, you have everything you need to calculate the reach of the added recess strategy.

How many elementary students are receiving the new recess? A. ____

What's the total community of students who *could* receive the intervention? B. ____

What's the reach? (Hint: A divided by B) _____

Changing Their Lifestyles in Significant Ways = Strength

As in the examples above, we can calculate an intervention's reach—the number of lives touched by or exposed to an intervention, expressed as a percentage of the target community population (the denominator).

What about the intervention itself? We want to know the *degree* to which people changed their health behavior choices as a result of being exposed to the intervention, ideally on a daily basis. Were they physically active for more minutes, every day or most days, compared to before? Did they eat more fruits and vegetables, not just once in a while but on a daily basis, compared to where they started before the intervention? Did they gradually decrease their daily intake of sugar-sweetened sodas?

Ideally, evaluations and published research help us express strength in terms of an effect size—the average percent change in behavior for each person exposed. For example, a researcher could have conducted a study of a new school PE curriculum, finding that students in the PE class increased their minutes of moderate/vigorous physical activity by 20 percent. If another community implemented a similar program, a 20 percent effect size would be reasonable to assume if the implementation and population were similar.

An effect size could also be calculated for a particular intervention or program. For example, if participants in a produce cooking class ate four servings each day of fruits and vegetables *before* taking the class and five servings *after* taking the class, the effect size would be 25 percent (the one-serving difference between four servings before and five servings after the class, divided by the baseline of four servings before the class).

In reality, we know that strength can be influenced by the following:

- the frequency of someone's exposure (all or most days or just once in a while?);
- the intensity of exposure (as above, the exercise or PE class versus a place where one could walk a bit more if sufficiently motivated and convenient); and
- the degree to which a healthy choice is really *the* choice (for example, all healthy choices in the vending machine or some healthy choices mixed with less healthy and perhaps more tempting ones).

In the many cases in which we may not have a rigorously researched, published effect size to work with, we rely on estimates about each of these factors—frequency, intensity, and the degree to which a healthy choice is a truly default choice—to capture the strength of a given strategy.

CALCULATING POPULATION DOSE: A WORK IN PROGRESS

When we combine the number of people exposed (reach) and the estimated impact or change in lifestyle for each person reached (strength), we get population dose (Figure 4).

For more on calculating effect sizes, strength, and dose, see Appendixes B–E. CHI's evaluators, the Center for Community Health and Evaluation and the University of California, have developed some preliminary effect size groupings on the basis of literature reviews and the CHI evaluation so far. These, along with a basic strength rating for strategies in physical activity, nutrition, or both categories, can be found in Appendixes B and C and are an extremely helpful starting point.



FIGURE 4 Calculating population dose.

Appendix D explains how strength has been calculated for the main behavior changes of interest in CHI: physical activity, fruit and vegetable consumption, and sugar-sweetened beverage intake. Appendix E provides more detailed examples about how dose is calculated for different interventions.

We can place strategies according to whether they are high to low reach and high to low strength, creating four simple categories similar to the ones in Figure 5. To achieve population health changes, communities would aim to achieve both high reach and high strength (i.e., the upper-right quadrant on these two-by-two grids).

Sometimes low-reach or low-strength strategies are still worthwhile, especially if they do not displace or distract from higher-reach, higher-strength options. For example, lower-reach, lower-strength strategies may help build capacity or increase community buy-in and set the stage for later successes. They may also reach a particularly high-need subpopulation.

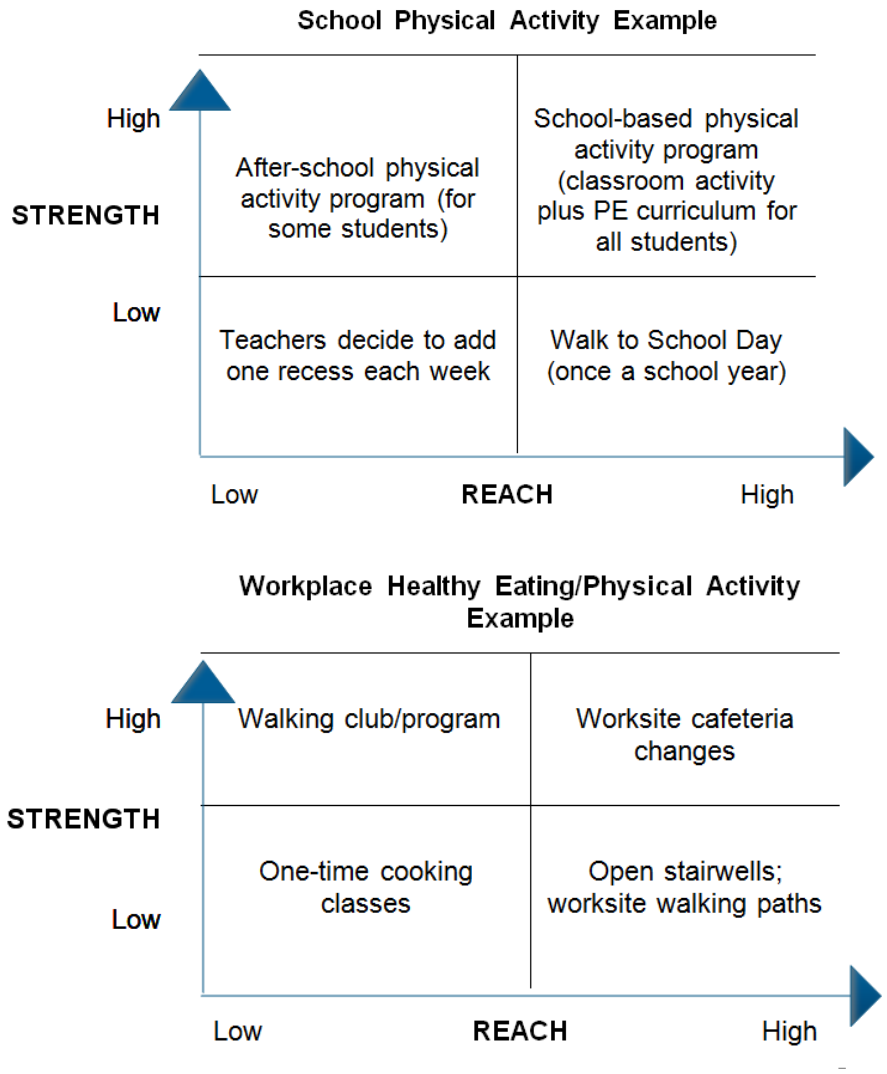


FIGURE 5 Dose grids.

Also note that most strategies can be designed and/or implemented to be high or low dose. In other words, an intervention could fit into different quadrants in the two-by-two grids, depending on how it is implemented. For example, a walk-to-school event could be organized once a year, once a semester, or more frequently—even every school day. It could reach a few students rarely, more students more frequently, or all students all the time. The more students it reaches, with more strength, the higher the dose.

When we apply calculations to the concept of population dose (see Appendixes B–E for more details on how this can be done), we see this same idea expressed quantitatively. For example, an intensive school-based physical activity program could reach just 5 percent of

students but deliver a high strength rating (e.g., 10 percent). Its dose (reach x strength): 5 percent x 10 percent = 0.5 percent.

Likewise, 25 percent of people in a target community may live near a new walking trail, but the strength rating is low because only a few people use the trail each day (for estimating purposes, approximately 2 percent). The walking trail's dose is thus 25 percent x 2 percent = 0.5 percent—exactly the same as the intensive school-based program.

Calculating effect sizes and measuring dose represent an ongoing work in progress currently being tested and refined by CHI's evaluators. We recognize that we are in the piloting stage of measuring strength, effect size, and thus dose itself. Although these calculations and measurements are preliminary, they support the hypothesis that strong interventions contribute to population health and that it is possible to build and combine strategies in ways that increase the chance they will have an impact in a particular community. One important implication is that even when specific calculations and measurements are not available, the concept of population dose can still be used to plan and implement stronger, more effective strategies and interventions—as described in more detail in the next section.

Calculating Dose for Combinations or Clusters of Interventions

The examples in Appendix E show how dose can be calculated for a specific intervention. In practice, though, many multisector, place-based initiatives (including CHI) combine multiple strategies that collectively target the same outcome. How does dose apply in these situations?

For the CHI evaluation, strategies were grouped into dose clusters according to the main outcomes of interest: physical activity, fruit and vegetable consumption, healthy foods, and sugar sweetened beverages. When strategies are clustered in this way, we do not assume that the whole is greater than the sum of the parts. Table 1 shows how dose was calculated for a cluster of five school-based strategies targeting physical activity in a CHI community.

TABLE 1 Population Dose Calculation Examples

Strategy	Estimated Dose = Reach x Strength (from literature reviews and evaluations)
After-school physical activity	0.4%
Classroom physical activity breaks	2.3%
Increase in minutes of physical education	2.3%
Policy changes to increase physical activity minutes	0.5%
Safe routes to school	2.0%
Dose cluster	7.5%

In this particular example, a pre/post survey of students about their overall minutes of physical activity was expected to yield measurable change because the cluster dose was greater than 5 percent. Indeed, although some students would have shown higher changes in their physical activity minutes and some lower, the average did turn out to be measurable and significant according to the surveys, at 4.1 percent. This finding gives us confidence that results on the ground are more likely to come from the dose cluster created by strong CHI interventions.

(For more on the variations in estimated dose and how we are interpreting them, see below and Appendix B.)

Ranges and Types of Expected Impact

When we add the estimated doses for strategies in a cluster (from evaluations and the literature, as constructed in the examples above), we are trying to estimate whether the expected impacts—even small ones—can produce effects when they occur on a population-wide basis. For example, if a 2 percent average increase in physical activity minutes results in a 1 percent decline in obesity rates each year and a 0.5 percent long-term decline in the prevalence of diabetes, that can have an impact in a community of 10,000 people. Each year, following these estimates, 100 fewer people would be categorized as obese, and 50 fewer people would be diagnosed with diabetes (Homer et al., 2010).

Because small doses translate into significant changes as they affect entire populations (or portions of populations), we are able to categorize dose estimates as follows:

- A dose less than 2 percent is considered low impact; we would not expect a significant impact;
- A dose between 2 percent and 5 percent could yield a significant impact but may not be large enough to measure with a population-level survey (which has limited ability to detect small changes); and
- A dose above 5 percent would be both significant and measurable, detectable through a population survey.

At this point in our work, these thresholds or tiers are somewhat arbitrary. Even as rough categories, though, they can offer guidance: in general, higher population dose is more likely to yield measurable, detectable changes. Low-dose strategies could be combined as part of a stronger dose cluster and/or strengthened in their own right to achieve population health outcomes. And even when estimated dose is relatively low and thus hard to detect through standard surveillance and surveys, it may still be worth considering.

In considering and comparing dose, note that the terminology of "expected" or "estimated" impacts is important. Before strategies have been implemented, we make an informed estimate or prediction of impact on the basis of calculations such as the ones above of reach and what we know or assume about strength and effect size from other similar interventions. (See Appendix E for more details about the specific components of these calculations.) Next, we measure actual reach through implementation data and obtain actual strength, to the extent possible, through strategy-level evaluations.

We measure impact in CHI communities through a population health survey, understanding that these types of data collection are not always possible, are often expensive and are unlikely to detect smaller effects. We also compare these results to secular trends from other data sources, such as the Behavioral Risk Factor Surveillance System or the Youth Risk Behavior Surveillance System over the same time period. If our hypothesis is correct that stronger-dose interventions can move population health, we expect to see measurable change, especially for clusters of strategies implemented together. The steps necessary to calculate population dose are highlighted in Box 2.

BOX 2

Steps to Estimate Dose for Clusters of Interventions

1. Determine reach and strength during the planning phase from published literature or estimations to determine an expected dose for groups of strategies focused on the same outcomes. Use these dose estimates for strengthening strategies (expanding reach or improving strength) where needed.
2. During implementation, use actual reach and strength from published literature to refine dose. If published literature is not available, conduct evaluations to obtain results or use estimations from Step 1.
3. Conduct population health surveys to measure behavior change in the outcome areas targeted by the groups of strategies.
4. Look for associations between dose and health behavior changes from population surveys.
5. Compare the results to secular trends over the same time period to see whether there are any associations.

   Caveats: Only a handful of communities have population health survey data available; surveys are unlikely to detect smaller effects.

As we obtain more data on more communities and more clusters of strategies, we should have a greater spread of dose estimates and associated population-level changes. As a result, our analysis approach will shift to what is shown in Figure 6—correlating the dose on the x-axis to the population-level change on the y-axis. If the two align, we can be more confident that observed population changes are a result of the CHI strategies being implemented—strategies with a higher population dose generated by a combination of higher reach and/or strength. The measurement challenges are considerable, but as we learn more, these estimates can continue to be refined.

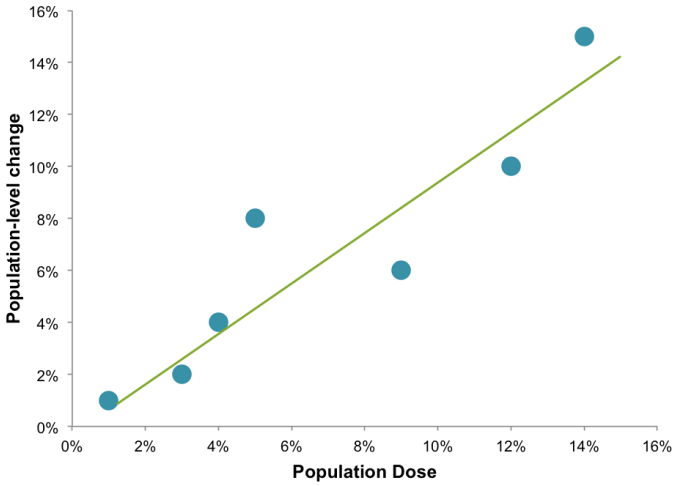


FIGURE 6 Measured population-level changes (if available) and estimated population dose.

EARLY FINDINGS

The 2009 evaluation of CHI offered early clues that dose matters. The next step was to confirm this with community-level evidence.

An initial review of survey data about population health changes in CHI communities did not yield differences with comparison groups. However, examining population-level results in communities with high-dose interventions told a different story. In almost half of those cases, results were significant—especially for youth interventions in schools targeting physical activity (Cheadle et al., 2012). As the examples below illustrate, we found that schools and school systems make high reach much easier to achieve than is the case in a broadly dispersed community (Figure 7).



Figure 7. Salida High School bike racks in Salida, Colorado.

- In 13 schools within a suburban Colorado community that participated in the Safe Routes to School initiative and implemented combinations of safety enhancements, infrastructure changes, and walk-to-school days, the percentage of children walking to school increased from 24 percent to 36 percent over a 2-year period.
- In Northern California, a combination of strategies—strengthening PE standards, adding physical activity breaks to after-school programs, implementing Safe Routes to School, including a walking school bus, and carrying out a community physical activity media campaign and school-based awareness strategies—led to an increase from 61 percent to 67 percent of children doing at least 20 minutes of vigorous physical activity per day.
- In a rural Colorado elementary school, a high-dose cluster of fruit and vegetable strategies included installing a salad bar and making other cafeteria changes, along with promotion. Evaluators measured an increase in self-reported fruit and vegetable consumption of 13 percent—perhaps even more significant among a target audience of finicky elementary school lunchers.
- Another Colorado community documented a significant, population-level increase of 4 percent in minutes per day of physical activity among youth after 3 years of high-dose, physical activity–focused strategies, which included a media/promotion campaign, implementation of action-based learning initiatives, and walk/bike to school and after-school physical activity programs.

For each of these CHI success stories in which clusters of strategies rated as "high dose" were associated with documented changes in behaviors, we also have stories of communities whose clusters of strategies were rated as low or medium, and we were unable to measure any change in behavior in these communities. Again, this does not necessarily mean that the strategies were not worth pursuing or did not achieve health outcome goals but that their effects could not be detected.

Still, these findings suggest that dose does indeed matter—and that without attention to achieving higher dose, we are unlikely to see health improvements at a population level. Moreover, by focusing on populations as the denominator for reach calculations, the CHI results have helped demonstrate that high doses and expected impacts can be achieved, even at relatively modest levels of per-capita changes. The 2 percent average increases in physical activity described above may not seem significant as a percentage, but across 10,000 people, they certainly are—especially for the 100 people not categorized as obese and the 50 not diagnosed with diabetes.

PRACTICAL IMPLICATIONS: WAYS TO INCREASE POPULATION DOSE

If dose matters and if high-dose strategies matter even more, how can we systematically and intentionally increase dose? How can we build dose into planning, technical assistance, strategy selection, and evaluation?

In part, we do so by asking the following: "Can we reach more people, more times, more often, for a longer period, throughout the year, and with supporting strategies across sectors?" The parts of this question are highlighted in Box 3. For almost any community health effort, this is an ongoing conversation. Even before engaging in quantitative calculations or rigorous evaluations, many members of CHI community collaboratives reported that they found dose useful at this level. For example, some CHI coalitions used the concept of dose during planning stages to identify evidence-informed strategies with a higher likelihood of having an impact on behavior and health outcomes than what they were doing before. An important corollary is to use the concept of dose to avoid or stop strategies that are failing to gain momentum so that those resources can be deployed elsewhere more effectively.

Collaboratives also used the concept of dose to communicate more clearly with residents and elected officials about why they were focusing on particular high-dose strategies and to build consensus and support for selected strategies. As one CHI coordinator explained, the concept of dose helped move the coalition beyond a desire to offer one-on-one classes. "We say to them: 'If you do that class, what is the reach? How often are they getting it?' It became a useful tool in working with the community."

While many CHI communities expressed the wish that they had started with the concept of dose earlier in their intervention process, dose can be a helpful lens at any point: during initial or strategic planning, ongoing planning and check-ins, implementation, or evaluation phases of community health interventions.

BOX 3

Questions to Ask to Build Higher-Dose Interventions

To build higher-dose interventions from any starting point, keep asking:

"Can we reach . . .

- more people,
- more times,
- more often, for a longer period,
- throughout the year, and
- across sectors?"

The first step is to start wherever a setting, sector, or community might be. For example, a community may want to work on healthy vending machine policies by moving to half healthy options and then to all healthy options. If that turns out to be impossible, it may be preferable to remove vending machines altogether. Likewise, in a school setting, a group might begin by taking on the cafeteria's menu offerings and then moving on to *a la carte* foods, competitive offerings, concessions, or options offered at sporting events and school celebrations—indeed, across the entire campus until all teachers, staff, and students are surrounded by healthy options every day. Once this is accomplished, they could move on to the food options near the school in corner stores or mobile vendors. With persistence and small wins, any point along this spectrum could lead to a much healthier environment inside and outside the school's walls, when the healthy choice truly becomes the default choice. This process is illustrated in Figure 8.

A similar continuum applies to active living (Figure 9). Some communities may start with a walking school bus, gradually expanding it to more days, more children, and more schools until an entire district is covered, building both reach and strength along the way. As this occurs, other changes will be needed to make walking safer (for example, by adding crosswalks and sidewalks), which in turn will require engaging parents and reaching even further into the community. Inside a school, changes might involve revamping a PE curriculum, adding recess in classrooms, and filtering to after-school programs. Depending on the community, building sidewalks might be more feasible in one place than changing school PE policies, and vice versa.

In addition to the main intervention(s) it is planning to implement, a community might also consider promotional or educational strategies that support or nudge people toward a particular behavior that might not be high dose on its own but might become so when combined with other interventions. For example, a booth at a farmers' market that teaches people how to prepare the fresh fruits and vegetables available there might not stand alone as a high-dose intervention, it but would support other interventions—such as making farmers' market produce more affordable for low-income families.

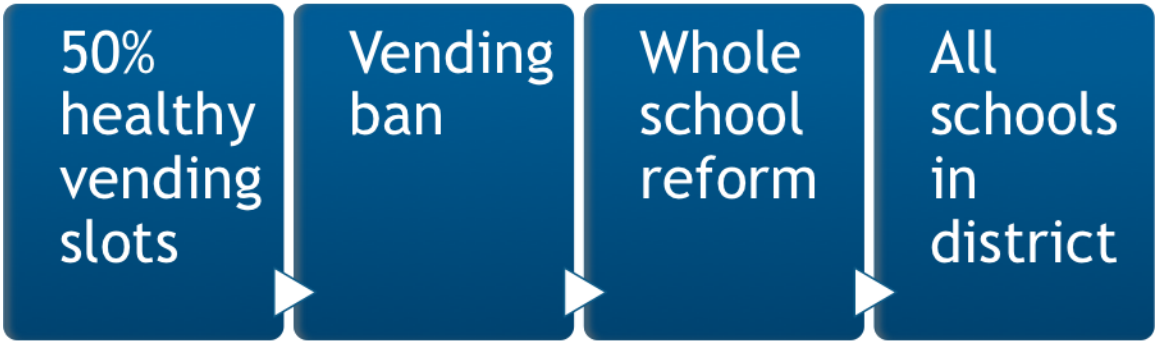


FIGURE 8 Continuum of interventions for healthy eating in schools.

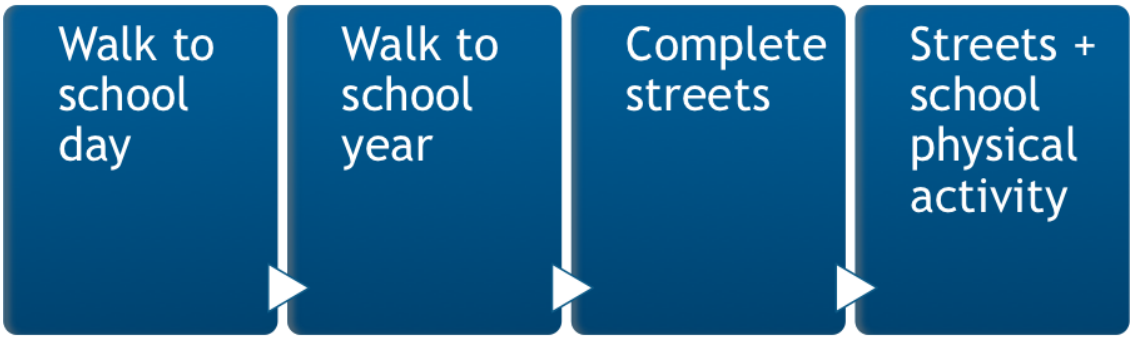


FIGURE 9 Continuum of interventions for active living.

Increasing Dose by Increasing Reach

Increasing reach requires spreading changes to more people—more neighborhoods, more facilities, more schools—to increase the proportion of people within a community who are exposed to a strategy or cluster of strategies.

Increasing Dose by Increasing Strength

Increasing strength means increasing the potency of the intervention or strategy on those reached. For example, a starting point might be to replace half the items in a vending machine with healthy items. A stronger strategy would be to offer only healthy items (100 percent instead of 50 percent) or, better yet, to remove the vending machines altogether. If this occurred in one school, it could be extended to all schools in a district or to schools as well as corner stores.

Similarly, a "Walk to School" day is a good start. But wouldn't a "Walk to School" year be even better? And what about a Complete Streets program that makes walking easier and safer for everyone, not just students? Complete Streets, coupled with a stronger school physical activity curriculum—inside and outside of PE class—would do even more. In school, physical activity breaks that go from 5 to 10 to 15 minutes per day add strength with every minute.

Increasing Dose in Specific Settings

As noted above, any setting—a neighborhood, a school, a workplace, or a public venue—can strengthen existing strategies no matter where these started. A cafeteria could meet nutrition guidelines and then remove unhealthy options and replace them with healthier ones, using pricing and placement options to encourage healthier choices and nutrition labeling to inform customers. Farmers' markets can add nutrition or cooking education or offer Women, Infants and Children or Electronic Benefit Transfer options for low-income shoppers. Workplaces can allot more time for employee physical activity breaks and support active transportation through bike sharing, bike racks, on-site showers, and changing rooms.

Implications for Evaluation, Planning, and Technical Assistance

As noted above, one of the most powerful ways to use the population dose approach is in the earliest phases of planning—when strategies are still being designed and packaged and before they are implemented. Asking hard questions about dose—a strategy's (or cluster of strategies) reach and strength, how each could be increased and how strategies could be combined to boost dose—could help agencies and coalitions select strategies that have a higher likelihood of achieving the health outcomes to which we all aspire. As we learned through our CHI midcourse corrections, asking these questions may be revealing in difficult ways, such as seeing interventions that are weaker than others or learning that dedicated efforts are too diffuse to make a difference. One outcome may be dropping some strategies in favor of others.

In some cases, these discussions will be internal. In others, some technical assistance from evaluators or other facilitators may be required to assess strategies from this vantage point and design the intermediate and outcome evaluations that help us understand whether our estimates of dose and impact are accurate.

As we continue to develop estimates of population dose for CHI strategies and gauge their impact using population surveys, we recognize the ongoing challenges. These types of evaluations are resource and time intensive; ideally, existing population health data can help supplement data for comparisons of estimated and measurable changes.

Even when strategies are effective, though, they may not yield significant and measurable findings. For this reason, measuring intermediate outcomes becomes vital for understanding and communicating impact (while keeping an eye on population health changes). Estimates that allow comparisons across strategies are particularly important for program design and evaluation, as well as for quality improvement purposes.

CONCLUSION

Exploring dose through the experiences of CHI communities across the country has taught us that interventions and strategies can be designed and implemented in specific ways—by increasing their reach and strength—to increase the likelihood of seeing health behavior improvements at a population level. The population dose concept has also given us an array of methodological tools that allow us to add and compare apples and oranges (to use a fresh produce analogy) and estimate impacts going forward.

The measurement aspects of dose are still a work in progress, but the CHI team at Kaiser Permanente and our evaluation colleagues at the Center for Community Health and Evaluation and the University of California are encouraged by the many ways population dose has been applied throughout CHI communities. The concept of population dose will continue to be refined, within CHI and beyond so that it becomes even more accessible to the many individuals, groups, and communities struggling with such dedication and intensity to improve the health outcomes of their families, neighbors, and colleagues. As this occurs, we welcome more communities joining the testing and refinement phase of this concept and how it can be measured.

Dose does matter. But what really matters is achieving the ideal of total health and well-being for as many of us as possible. Dose matters because it holds the promise of helping us get there faster and more efficiently and with more lasting results than would be the case if we did not have the insights dose can offer about what does and does not work.

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Suggested Citation

Schwartz, P., S. Rauzon, and A. Cheadle. 2015. *Dose matters: An approach to strengthening community health strategies to achieve greater impact*. Discussion Paper, National Academy of Medicine, Washington, DC. http://www.nam.edu/perspectives/2015/dosematters.

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RELATED RESOURCES

To support the spread of the dose methodology for those who are doing community health intervention work, Kaiser Permanente and the Center for Community Health and Evaluation have created an interactive compendium of tools and resources that provides an overview of the methodology and an understanding of how to apply dose to community health intervention strategies. You can download and access the Healthy Dose Toolkit at: http://share.kaiserpermanente.org/article/dose-creating-measuring-impact/.

APPENDIXES

A. CHI Logic Model
B. Effect Size Groupings
C. Strength Rating Guide
D. Strength Formulas by Strategy
E. Calculating Dose Examples

APPENDIX A

CHI Logic Model

Each box and circle of this logic model has been explored by the ongoing CHI evaluation, but the main focus has been on the intermediate outcomes, specifically the health-promoting system changes that lead to increases in healthy eating (nutrition) and physical activity (shown in the **red oval**).

In addition, to better understand the context for interventions and the role of changes in **community capacity**, researchers have also focused on strategies that support capacity building at the community level.

1

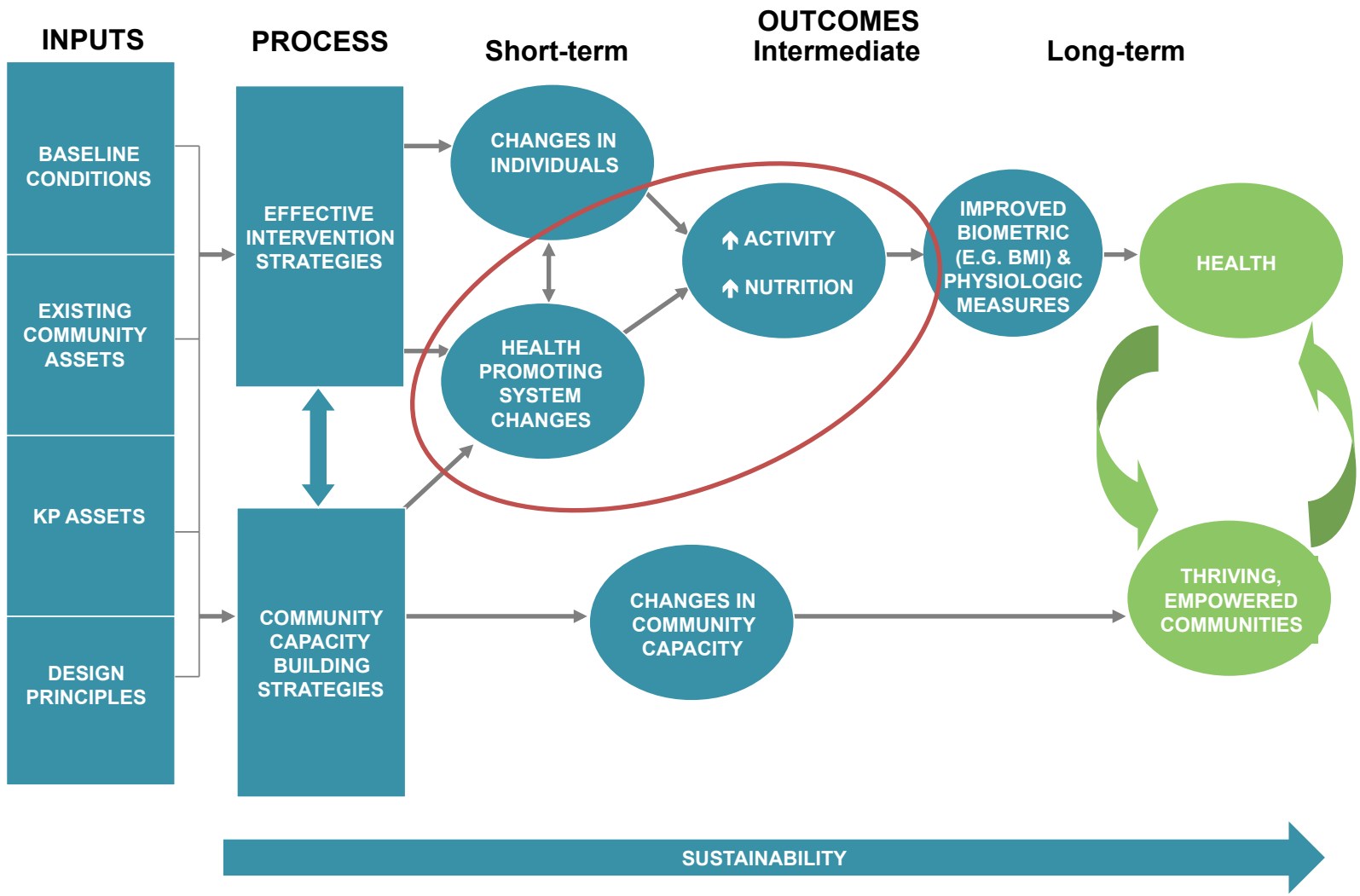


FIGURE A-1 CHI logic model.
KP, Kaiser Permanente.

APPENDIX B

Effect Size Groupings[1]

For population dose purposes, "effect size" is synonymous with intervention strength. It refers to the degree to which people who are exposed to an intervention strategy change their behavior to make healthier choices as a result of that exposure. The "effect size" is the mathematical expression of the average percent change in behavior for each person exposed. For example, if participants in a produce cooking class ate four servings each day of fruits and vegetables *before* the class and five servings *after* taking the class, the effect size would be 25 percent (the one-serving difference between four servings before and five servings after the class, divided by the baseline of four servings before the class).

How do we figure out the strength or effect size? In general, these estimates come from either published research on a similar intervention and population or a specific evaluation of the intervention (as in the example above).

Table B-1 shows some effect size groupings based on strategy-level evaluations from CHI and literature reviews.

Table B-1: Effect size of groupings

Effect Size	Description	Examples
No effect—0%	No consistent positive effect sizes based on our evaluations or the literature, or trivial given reach	Healthy corner store Menu labeling
Minimal—0.5%	Usually large reach, small touch that have small effects that can contribute to overall dose cluster	Vending machines Nutrition education class
Low—2%	Low effect sizes but are still non-zero, statistically significant, often environmental	Safe Routes to School (SRTS) Farm to institution
Medium—5%	Fairly strong strategies that show significant effects, often measurable on a population level	Action-based learning Physical activity in class Salad bars in school lunches
High—10%	Usually programmatic, often very low reach, but very impactful for those who participate	Zumba class, daily walking club Community supported agriculture produce for low-income families

[1] Based on strategy-level evaluation evidence and literature review. See Kaiser Permanente and Center for Community Health and Evaluation (September 2014), *Measuring and increasing the "dose" of community health interventions.* For more information, see http://share.kaiserpermanente.org/article/dose-creating-measuring-impact/.

APPENDIX C
Strength Rating Guide

Strategy category	*Example strategy*	*Reach definition*	*Rating default*
Physical activity			
Biking/bike safety	• Bike safety education • Bike racks	• # participants in programs • # living in area affected by env changes	Low
Complete streets Or General plan	• Completing a sidewalk network • Zoning changes for walkability	• # of residents living in areas affected by improvements	Low
Safe Routes to School	• Walk to school days • Walking school bus	• # of students enrolled in the school	Low
Physical activity programs	• Walking club, Yoga class • Afterschool Programs	• # of program participants	Medium – Schools High - Community
Park/ Playground	• Improved park amenities – playfields, fitness equipment	• # of residents living near park or playground (e.g. within ½ mile)	Low
Walking trails	• Build a new walking trail connecting neighborhoods	• # of residents living near trails (e.g. , within ¼ mile)	Low
PE curriculum	• Adopt an evidence-based PE curriculum	• # of students participating in the PE or after school curriculum	Medium
Recess/classroom PA	• Increasing length/freq of recess • In-class exercise	• # of students having recess • # of children in classrooms	Low
Nutrition			
Breastfeeding promotion/Ed	• Provider training around breastfeeding counseling	• # of mothers who gave birth • # of mothers who received education	Minimal
Cafeteria	• Increasing healthiness (more f/v, less fat, whole grain, fresh vs processed, refined sugar)	• # of students in a school • # of employees in a worksite	Low – Schools Minimal - Community
Vending	• Remove unhealthy snacks from vending machines	• # of students in a school • # of employees in a worksite	Minimal
Healthy snacks/ rewards	• Change classroom rewards to healthier items	• # of students/children in schools/pre-schools	Minimal
Nutrition education	• 1 time Cooking classes • Classroom or garden nutrition ed	• # who received counseling • # who took a class	Minimal
Farm to institution/ CSA programs	• Promoting the purchasing of local foods by schools, hospitals etc.	• # of people in the organization(s) receiving food	Medium - Schools Low- Community
Farmers' markets	• Creating a new farmers market	• # of shoppers • # of WIC coupon, EBT users	Low
Gardens	• Planting a school garden • Using a community garden plot • Donating produce to foodbank	• # of participants in school pgm • # of regular gardeners X family size • # people at foodbank using it	Low
Healthy food retail	• Increasing healthy food options in corner stores	• # of shoppers or patrons	Minimal
Restaurants	• Menu labeling • Increase # of healthy entrees	• Average number of patrons served daily	N/A
Both nutrition & PA			
BMI Screening & Referral	• BMI in the chart • Counseling referral for overweight	• # of people screened	Minimal
Health Coaching	• BMI change over time • Fitnessgram	• # of participants	Low
Media/Social marketing	• Media campaign to raise awareness about HEAL	• # exposed to media campaign – radio/TV viewers, estimate of print exposure	Minimal
Resident advocates/ Promatoras	• Outreach to residents to promote HEAL	• # contacted by advocates	Minimal
School Wellness/CSH Early Childhood Worksite wellness	• Implement school-wide HEAL promoting policies and practices • Healthier snacks in childcare • Implement worksite wellness pgms	• broken up into subsets, and rating each program/policy separately	Not rated – rate specific programs separately

APPENDIX D

Strength Formulas by Strategy

Strategy Strength	=	**% of people impacted**	X	**Increase in behavior (for physical activity and fruit and vegetable consumption) or net healthy intake (for SSB)**	X	**Frequency**		
Physical Activity Strategy Strength	=	% impacted by the intervention	X	% increase in physical activity minutes	X	frequency of exposure		
Fruit and Vegetable Strategy Strength	=	% impacted by the intervention	X	% increase in servings of fruits and vegetables	X	frequency of exposure		
Sugar Sweetened Beverage (SSB) Strategy Strength	=	% impacted by the intervention	X	% energy intake affected	X	decrease in unhealthy	X	frequency

APPENDIX E

Calculating Dose: A Physical Activity Strategy Example

A neighborhood park has added walking trails and a playground in an effort to increase physical activity levels for the neighborhood's residents—those living within a quarter-mile radius of the park. The entire community has about 10,000 residents.

What Is the Strength Formula for Physical Activity Strategies?

The strength of a physical activity strategy reflects relative changes in the minutes of physical activity, either compared to baseline data from population surveys or the use of national averages for daily minutes of physical activity from the most recent National Health and Nutrition Examination Survey (NHANES) dataset. Estimates are adjusted for exposure—for example, the number of days children are in school or, in the example below, the number of days a park is usable because of local weather.

The formula would be:

Physical Activity Strategy Strength = (% impacted by the intervention) x (% increase in physical activity minutes) x (frequency of exposure)

What Do We Know (Or What Can We Learn)?

An evaluator observed that 10 people, on average, used the park per day at baseline, but after the improvements, 50 people used it every day. The park is located in a state where it can be used comfortably about nine months out of the year, weather permitting.

An additional intercept survey gleaned the information that users averaged about 30 minutes of physical activity per visit.

What Can We Safely Assume?

Estimates from NHANES and others suggest that the average minutes of physical activity per day for adults is 28 minutes per day, consistent with the intercept survey.

Using census data and mapping software, we are confident that about 500 people live within a quarter mile of the park, and an intercept survey further confirms that nearly all users—90 percent—live this close.

Table E-1 Doing the Math: Physical Activity

Reach	People living within one-quarter mile of the park, divided by the number of people in the whole community	500/10,000	=	5.0%
Strength	40 new users after the change (from 10 to 50) 30/28 minutes physical activity per day per user 9 of 12 months of the year park use	(40/500) x (30/28) x (9/12) .08 x 1.07 x .75	=	6.4%
Dose	Reach x Strength	5.0% x 6.4%	**=**	**0.3%**

Calculating Dose: A Fruit and Vegetable Strategy Example

A Community Supported Agriculture (CSA) program for low-income households provides free weekly deliveries of local produce to 100 families in a community of 10,000 for half the year—25 weeks. Each delivery includes about 10 pounds of produce.

What Is the Strength Formula for Fruit and Vegetable Strategies?

The formula reflects the relative change in servings of fruits and vegetables consumed, either compared to baseline data from a population survey, or the use of national averages for daily servings from NHANES datasets. Estimates are adjusted for exposure (e.g., the number of days students are in school and eating in a healthier cafeteria, the number of weeks during which fresh produce is delivered through a CSA program for low-income families).

The formula would be:

Fruit and Vegetable Strategy Strength = (% impacted by the intervention) x (% increase in servings of fruits and vegetables) x (frequency of exposure)

What Do We Know (Or What Can We Learn)?

A survey of the families indicates that users of this produce were eating about two cups of fruits and vegetables a day before the CSA program started.

About 10,000 people live in this community.

What Can We Safely Assume?

The average family size is 2.5 people. Each pound of produce is about 3 cups.

Table E-2 Doing the Math: Fruit and Vegetable Strategy Example

Reach	100 families, 2.5 people/family, 10,000 residents in the total population	100 x 2.5 / 10,000	=	2.5%
Strength	(10 pounds of produce x 3 cups/lb. / 2 cups at baseline / 2.5 people per household) (1/7 days a week x 25/52 weeks per year)	(10 x 3/2/2.5) (1/7 x 25/52)	=	41%
Dose	Reach x Strength	2.5% x 41%	=	**1.0%**

Calculating Dose: A Sugar-Sweetened Beverage Strategy Example

An elementary school whose enrollment is 800 students (out of a total district enrollment of 2,000) removes chocolate milk from the menu. Before the chocolate milk option was removed, about half the children purchased chocolate milk daily.

What Is the Strength Formula for Sugar-Sweetened Beverage Strategies?

The effect size of these strategies uses a formula that reflects the proportion of daily energy intake rather than the effect on calories per day (which varies significantly from one person to the next).

The formula would be:

Sugar Sweetened Beverage Strategy Strength = (% impacted by the intervention) x (% energy intake affected) x (decrease in unhealthy) x (frequency)

What Do We Know (Or What Can We Learn)?

Sugar-sweetened beverages average 10 percent of total daily energy intake, with two beverages per day. Therefore, each sugar-sweetened beverage is equivalent to 5 percent of the total daily energy intake (per NHANES).

Half of the students purchased chocolate milk daily.

What Can We Safely Assume?

The removal is complete—no chocolate milk will be offered. Frequency of exposure needs to be adjusted for the number of days students are in school.

Table E-3 Doing the Math: Sugar-Sweetened Beverage Strategy Example

Reach	All students at one school (800) / total district enrollment (2,000)	800/2,000	=	40%
Strength	(50% change in behavior, since only half purchase school lunch) x (5 % SSB) x (100% removal of chocolate milk) x (5/7 days per week and 8/12 months per year)	(50 x .05 x 100) x (5/7 x 8/12)	=	1%
Dose	Reach x Strength	40% x 1%	=	**0.4%**

SSB, sugar-sweetened beverage.

American Journal of
Preventive Medicine

COMMENTARY

The Kaiser Permanente Community Health Initiative: A Decade of Implementing and Evaluating Community Change

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INTRODUCTION

In the early 2000s, the problem of obesity was already well recognized[1] and rising to the top of the public health agenda. The risks of obesity to health are clear: life-threatening and chronic illnesses that shorten life spans, reductions in quality of life, and contributions to healthcare cost inflation that are crowding out other critical social investments. Rates of obesity and the consequences for health are especially high in low-income communities of color.[2]

At that time, the obesity-prevention strategies that were being recommended and rigorously evaluated were individual-level interventions and more traditional health promotion approaches, for example, provision of information, counseling, and education.[1] However, a number of new strategy ideas were surfacing and gaining traction, strategies that were system-level interventions and focused on policy change (e.g., comprehensive school health policies) and changing food and physical activity environments (e.g., grocery stores, restaurants, built environment).[3–5] Evidence about the effectiveness of these newer strategies was limited, and recommendations for which strategies to implement were based largely on theory and expert opinion.[6]

Accompanying these innovative strategies were calls for more comprehensive, community-level approaches involving synergistic combinations of strategies and systems approaches.[2] The idea of a multilevel, multisector approach emerged, using the levels of the socioecologic model[7] (e.g., individual, family, community) applied to different community sectors (e.g., school, worksite, neighborhood). This more comprehensive approach recognized that the epidemic is driven by many complex and interrelated factors: cultural, economic, social, genetic, and environmental influences that are hard to disentangle and address separately.[8–11]

This comprehensive community-level approach to obesity prevention grew out of a longer tradition of community health–promotion initiatives that began with the North Karelia Project[12] in Finland in the 1970s. Developers of these initiatives argued that health issues with complex causes could be more effectively addressed with multiple strategies targeting residents of a geographic location. Examples of these community-level initiatives included randomized trials, such as the Community Intervention Trial for Smoking Cessation[13] (tobacco prevention) and the Stanford Five-City Project[14] (cardiovascular disease), as well as more community-driven, less rigorously evaluated initiatives, such as healthy cities/healthy communities interventions.[15]

THE KAISER PERMANENTE COMMUNITY HEALTH INITIATIVE

In 2003, Kaiser Permanente incorporated many of these ideas about policy/environmental strategies and comprehensive community-level approaches into the development of its Community Health Initiative (CHI), a multisector, place-based initiative designed to promote healthy eating and active living (HEAL) and reduce obesity in low-income communities.[16] Kaiser Permanente is an integrated healthcare delivery system serving more than 12 million members in eight states and the District of Columbia. The CHI focus on community-level

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This article is part of a supplement entitled Building Thriving Communities Through Comprehensive Community Health Initiatives, which is sponsored by Kaiser Permanente, Community Health.

0749-3797/$36.00

https://doi.org/10.1016/j.amepre.2018.02.004

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health improvement reflects a growing understanding that much of what determines health occurs outside of clinical settings. The CHI framework includes a focus on practice, policy, and environmental changes; strategies that employ both community and Kaiser Permanente's own assets; long-term partnerships and investments; and a commitment to using evidence where it is available and building the evidence base where it is lacking. As CHI unfolded, evidence in support of these design principles also began to accumulate in the literature,[2,17] and other funders and organizations implemented similar comprehensive community initiatives: W.K. Kellogg Foundation's Food and Fitness Initiative[18] and the Robert Wood Johnson Foundation's Healthy Kids/Healthy Communities[19] and Active Living by Design[20] initiatives, and the Centers for Disease Control and Prevention's (CDC's) Communities Putting Prevention to Work Initiative funded under the American Relief and Reinvestment Act of 2009.[21]

Since 2005, when the first three CHI sites were begun in Colorado, Kaiser Permanente has implemented CHI in six of eight regions and nearly 60 communities (32 communities in Colorado, nine in Northern California, nine in Southern California, six in the Pacific Northwest, and an additional two initiatives each in Maryland and Georgia). The CHI communities were phased in over time and varied by duration and design—in line with the interests and readiness of the community collaborative formed to do the work. The median duration of the funding for the sites is 4 years, with almost a third funded for 7–10 years. Total Kaiser Permanente intervention spending across all of the regional CHI initiatives now exceeds $60 million.

But did CHI work? Were strategies successfully implemented? Did people touched by the strategies change their health behavior in positive directions? And most importantly, was the combined impact of multiple strategies enough to impact health behaviors at a community level —the "north star" for the initiative? That is, was a representative community resident eating healthier and exercising more as a result of CHI community change strategies?

There are many challenges to conducting credible evaluations of community-level initiatives, particularly evaluations that include an assessment of their impact on population-level behaviors and health outcomes.[22] Longer-term outcomes, such as improvements in food and physical activity behaviors, are expensive and difficult to measure accurately at a population level and attribute to a multistrategy initiative. And more short-term outcomes, such as changes to the food and physical activity environments, are typically complex and multidimensional, making it difficult to create summary measures of the extent of the environmental changes and their likely impact on behavior. Finally, because some work related to obesity prevention is taking place in most communities, it is difficult to find true comparison communities.

CHI evaluators developed methods to address these challenges, including using the concept of population dose to help assess the impact of a diverse collection of environment and policy change strategies on population-level outcomes and more accurately attribute those changes to the initiative.[23] In addition, we conducted a number of evaluations of individual strategies (strategy-level evaluations) that helped add to a growing evidence base on the newer policy and environmental approaches to obesity prevention. The methods used were revised over time to better assess the impacts in Kaiser Permanente communities and to provide more real-time feedback to the community-based organizations doing the work. The methods and measures were developed with the dual goal of providing results of use to the communities, as well as health outcomes of interest to public health and healthcare organizations. The evaluation also had a strong formative component—using evaluation results and methods, particularly population dose, to help build stronger interventions.[24]

The CHI evaluation results, some of which are presented in the articles in this issue, have shown impressive progress toward implementing strategies and impacting communities. As of this writing, a total of 730 policy, programmatic, and environmental strategies have been implemented, reaching a total of 715,000 people across all of the CHI communities. Fifty-one percent of the strategies have resulted in either policy or environmental changes, a key CHI design principle given evidence that such strategies may be more sustainable over the long term. Another 18% of strategies focused on community capacity building; for example, training residents in policy advocacy and building stronger community coalitions, and thus laying the groundwork for future change.

The CHI evaluation included an assessment of the behavior-change impact of individual strategies. Of the 143 individual strategies that were evaluated, 98 (69%) showed positive results related to promoting individual behavior change. Strategies with demonstrated impact among youth in schools include physical education curriculum, active recess, Safe Routes to School and cafeteria modification; impactful community strategies include physical activity programs and park improvements. Articles in this supplement issue go into more depth on the strategy-level evaluation results, including a summary of

results from the Southern California region,[25] and three papers describing strategy-level evaluations in Northern California—in child care settings[26,27] and corner stores.[28]

As for the CHI goal of changing health behaviors at the population level, pre and post surveys of both youth and adults were conducted in approximately half of CHI communities (n=24). Looking at the results across four health areas (physical activity minutes, and consumption of fruits and vegetables, sugar-sweetened beverages, and healthy food [e.g., healthier snacks]), the results were relatively modest; positive population-level behavior changes that exceeded benchmark trends were detected in 13 of the 96 comparisons (14%; note: 96 comparisons=24 communities times four health areas). However, when we computed the dose of the clusters of strategies being implemented in each area and correlated the dose measure with population change, the results were more striking. Higher-dose strategy clusters were associated with positive population change in six of nine cases (66%) versus seven of 87 (8%) for lower-dose strategies. Most of these dose-aligned improvements have occurred among youth in schools. The impact has been greatest in physical activity; nearly 40% of communities have had increases in minutes of youth physical activity that could be attributed to CHI strategies. We have also seen declines in sugar-sweetened beverage consumption among adults and youth in several communities, although the related CHI strategies were not determined to be high dose. This suggests that CHI may have contributed to, but not solely influenced, this outcome, considering the presence of widespread state and local public health campaigns focused on this behavior at the time. The paper in this issue describing the HEAL Zones results in California[25] presents a sampling of these results in greater detail.

An important lesson that emerged from our decade of implementing and evaluating the CHI place-based initiatives is that dose matters (i.e., the cluster of strategies in any one health area must be of sufficient scale and impact to produce positive changes in population health). But it is challenging to get to higher dose, particularly in community settings. Some facilitating factors, which have also been noted in other initiatives, include the following:

- Strong partnerships with key institutions. To reach scale and impact in a place-based initiative, there is a need to partner with key institutions (e.g., schools, worksites, clinics) that reach large numbers of residents.
- Organizational readiness and community engagement. There needs to be community capacity and commitment to a policy/environmental approach to HEAL if change is to happen. For example, schools must prioritize HEAL along with other elements of their educational mission, which requires a champion at the district or school level or both plus leadership support from the principal or superintendent. To get that commitment requires strong engagement efforts with key decision makers, groups, and institutions.
- Patience with the time required to create change. At least 1 to 2 years were required to implement policy and environmental changes, and often longer. Institutions must be brought on board, plans created, and implementation trials carried out and revised. And some time is required for the changes to take hold and begin to influence behavior—there were few changes observed in initiatives with less than 5 years' duration.

In addition to the CHI place-based initiatives, Kaiser Permanente has participated in a wide range of complementary activities to promote changes in national and state-level policies and overall norms around obesity, physical activity, and healthy eating. For example, Kaiser Permanente founded or co-founded several national organizations and programs, including the following:

- Partnership for a Healthier America. Formed in 2010, Partnership for a Healthier America is an outgrowth of First Lady Michelle Obama's Let's Move! Campaign to end childhood obesity, bringing together leaders from all sectors to negotiate meaningful and measurable commitments, develop strategies, and track the impact of efforts to end childhood obesity. Commitments from Partnership for a Healthier America partners have resulted in nearly 70,000 children in day care eating healthier meals; more than 370 new grocery stores opening in neighborhoods with low access to healthy, affordable food; and more than 3 million kids taking part in increased physical activity.
- Convergence Partnership. Co-founded by Kaiser Permanente in 2006, the Convergence Partnership is a coalition of funders focused on accelerating policy and environmental approaches to prevention—achieving the vision of healthy people living in healthy places. The partnership has supported organizations that successfully advocated for the federal Healthy Food Financing Initiative, leveraging more than $1 billion to bring healthy food retail into neighborhoods that have inadequate access to healthy food.
- Weight of the Nation. Kaiser Permanente was a partner and co-funder of the Weight of the Nation with the National Academy of Medicine, NIH, and HBO to bring national attention to the obesity epidemic, and related social media and

community engagement strategies linked to mobilize action.

- Everybody Walks Campaign. In 2011, Kaiser Permanente launched the Every Body Walk! campaign to inform adults about the overall health benefits of walking. The goal is to provoke a national conversation about the health benefits of walking and what we can do together to address the barriers to making walking a part of everyday life.

In addition, Kaiser Permanente has supported efforts to build the evidence base for community obesity prevention efforts, including the following:

- Bridging the Evidence Gap in Obesity Prevention: A Framework to Inform Decision Making.[29] Released in April 2010, this report from the National Academy of Medicine addresses what is often perceived to be a dearth of actionable, evidence-based recommendations for what policymakers, community leaders, and others can do to stem the rising tide of obesity rates. The report was commissioned by Kaiser Permanente, CDC, and the Robert Wood Johnson Foundation.
- Accelerating Progress in Obesity Prevention.[30] Released in 2012, this National Academy of Medicine report focused on the areas of obesity prevention that are most important to pursue to significantly accelerate progress in obesity prevention. The report was funded by Kaiser Permanente, the Robert Wood Johnson Foundation, and the Michael & Susan Dell Foundation.

PREVIEW OF THE ARTICLES IN THIS ISSUE

In this supplement issue of the *American Journal of Preventive Medicine*, we include articles that describe the innovative CHI evaluation methods and present findings at both the strategy and population levels. The focus of the majority of the articles is on Colorado (LiveWell Colorado [LWC]) where more than half of the CHI communities are located, but results are also included from two other Kaiser Permanente regions—Northern and Southern California. As will be described in more detail in the articles, all three regions had somewhat different combinations of funding partners, technical assistance strategies, and evaluation methods. For example, the Colorado CHI initiative included the creation of the LWC nonprofit organization to lead the place-based initiative and promote statewide policy change, and an intensive network of technical assistance to support individual communities in implementing their strategies. Funding for LWC came from the Colorado Health Foundation in addition to a substantial investment from Kaiser Permanente Colorado.

Three papers describe our population dose methodology, including an overview of the method[23] and a description of how dose is used in planning and implementing interventions.[24]

Several papers describe community strategies and results in LWC communities, illustrating the overall LWC approach and innovative approaches in individual communities. Strategies highlighted include playground improvements,[31] school food policies and their impact on food served in cafeterias,[32] and food insecurity interventions.[33] Two other papers take a higher-level look at policy and sustainability of the LWC model: the HEAL Cities and Towns interventions[34] and overall sustainability.[35]

The other papers present results from the Northern and Southern California HEAL Zone initiatives. Three papers describe strategy-level evaluations in Northern California: in child care settings[26,27] and corner stores.[28] Population-level results are presented for each of the California regions.[25]

The evaluation results presented in these papers are examples of the kind of practice-based research that has been called for to expand the evidence base around interventions in community settings.[36] The results provide a summary of 10 years of implementing CHI that we hope will provide useful lessons for others working to improve the health of their communities.

ACKNOWLEDGMENTS

This project was funded by Kaiser Permanente. The authors acknowledge and thank Kaiser Permanente for financial support.

No financial disclosures were reported by the authors of this paper.

SUPPLEMENT NOTE

This article is part of a supplement entitled Building Thriving Communities Through Comprehensive Community Health Initiatives: Evaluations from 10 Years of Kaiser Permanente's Community Health Initiative to Promote Healthy Eating and Active Living, which is sponsored by Kaiser Permanente, Community Health.

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SPECIAL SYMPOSIUM: INTERVENTIONS TO REDUCE RACIAL AND ETHNIC DISPARITIES IN HEALTH CARE



A Roadmap and Best Practices for Organizations to Reduce Racial and Ethnic Disparities in Health Care

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Over the past decade, researchers have shifted their focus from documenting health care disparities to identifying solutions to close the gap in care. Finding Answers: Disparities Research for Change, a national program of the Robert Wood Johnson Foundation, is charged with identifying promising interventions to reduce disparities. Based on our work conducting systematic reviews of the literature, evaluating promising practices, and providing technical assistance to health care organizations, we present a roadmap for reducing racial and ethnic disparities in care. The roadmap outlines a dynamic process in which individual interventions are just one part. It highlights that organizations and providers need to take responsibility for reducing disparities, establish a general infrastructure and culture to improve quality, and integrate targeted disparities interventions into quality improvement efforts. Additionally, we summarize the major lessons learned through the Finding Answers program. We share best practices for implementing disparities interventions and synthesize cross-cutting themes from 12 systematic reviews of the literature. Our research shows that promising interventions frequently are culturally tailored to meet patients' needs, employ multidisciplinary teams of care providers, and target multiple leverage points along a patient's pathway of care. Health education that uses interactive techniques to deliver skills training appears to be more effective than traditional didactic approaches. Furthermore, patient navigation and engaging family and community members in the health care process may improve outcomes for minority patients. We anticipate that the roadmap and best practices will be useful for organizations, policymakers, and researchers striving to provide high-quality equitable care.

KEY WORDS: disparities; quality of care; race; intervention; equity.
J Gen Intern Med 27(8):992–1000
DOI: 10.1007/s11606-012-2082-9
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In 2005, the Robert Wood Johnson Foundation (RWJF) created Finding Answers: Disparities Research for Change (www.solvingdisparities.org) as part of its portfolio of initiatives to reduce racial and ethnic disparities in health care.[1] RWJF charged Finding Answers with three major functions: administer grants to evaluate interventions to reduce racial and ethnic disparities in care, perform systematic reviews of the literature to determine what works for reducing disparities, and disseminate these findings nationally. Over the past seven years, Finding Answers has funded 33 research projects and performed 12 systematic literature reviews, including the five papers in this symposium.[2–6] We are now beginning to leverage this research base to provide technical assistance to organizations that are implementing disparities reduction interventions, such as those participating in RWJF's Aligning Forces for Quality program.[7]

This paper summarizes the major lessons learned from the systematic reviews and provides a disparities reduction framework. Building on our prior work,[8–10] we present a roadmap for organizations seeking to reduce racial and ethnic disparities in health care. This roadmap may be tailored for use across diverse health care settings, such as private practices, managed care organizations, academic medical centers, public health departments, and federally qualified health centers. Specifically, we outline the following steps:

1) Recognize disparities and commit to reducing them
2) Implement a basic quality improvement structure and process
3) Make equity an integral component of quality improvement efforts

Electronic supplementary material *The online version of this article (doi:10.1007/s11606-012-2082-9) contains supplementary material, which is available to authorized users.*

4) Design the intervention(s)
5) Implement, evaluate, and adjust the intervention(s)
6) Sustain the intervention(s)

FINDINGS FROM THE SYSTEMATIC REVIEWS

The five systematic reviews in the present symposium examined interventions to improve minority health and potentially reduce disparities in asthma, HIV, colorectal cancer, prostate cancer, and cervical cancer.[2–6] While many valuable ideas to address racial and ethnic health disparities are being pursued outside of the healthcare system, Finding Answers focuses specifically on what can be accomplished once regular access to healthcare services is achieved. Thus, the reviews focused on interventions that occur in or have a sustained linkage to a healthcare delivery setting; programs that were strictly community-based were outside the scope of the project. Additionally, the reviews examined racial and ethnic disparities in care and improvements in minority health, rather than geographic, socioeconomic, or other disparities. For a description of search strategies employed in these reviews, see the technical web appendix which can be accessed online (Electronic Supplementary Material).

Each review identified promising practices to improve minority health within the healthcare setting. The asthma paper found that educational interventions were most common, with culturally tailored, skills-based education showing promise.[5] Outpatient support, as well as education for inpatient and emergency department patients, were effective. Similarly, the HIV review noted that interactive, skills-based instruction was more likely to be effective than didactic educational approaches for changing sexual health behavior.[3] The paper identified a dearth of interventions that target minority men who have sex with men. The colorectal cancer review found that patient education and navigation were the most common interventions and that those with intense patient contact (e.g., in person or by telephone) were the most likely to increase screening rates.[4] The colorectal cancer review identified no articles that described interventions to reduce disparities in post-screening follow-up, treatment, survivorship, or end-of-life care. Based on low to moderate evidence, the cervical cancer review reported that navigation combined with either education delivered by lay health educators or telephone support can increase the rate of screening for cervical cancer among minority populations.[2] Telephone counseling might also increase the diagnosis and treatment of premalignant lesions of the cervix for minority women. The prostate cancer review focused on the importance of informed decision making for addressing prostate cancer among racial and ethnic minority men.[6] Educational programs were the most effective intervention for improving knowledge among screening-eligible minority men. Cognitive behavioral strategies improved quality of life for minority men treated for localized prostate cancer. However, more research is needed about interventions to improve informed decision making and quality of life among minority men with prostate cancer.

CROSS-CUTTING THEMES

We looked across these reviews and Finding Answers' previous research,[11–17] and identified several cross-cutting themes. Our findings showed that promising interventions frequently were multi-factorial, targeting multiple leverage points along a patient's pathway of care. Culturally-tailored interventions and those that employed a multi-disciplinary team of care providers also tended to be effective. Additionally, we found that education using interactive methods to deliver skills training were more effective than traditional, didactic approaches in which the patient was a passive learner. Patient navigation and interventions that actively involved family and community members in patient care showed promise for improving minority health outcomes. Finally, the majority of interventions targeted changing the knowledge and behavior of patients, generally with some form of education. Interventions directed at providers, microsystems, organizations, communities, and policies were far less common, thus representing an opportunity for future research.

ROADMAP FOR REDUCING DISPARITIES

Table 1 summarizes the major steps health care organizations need to undertake to reduce disparities. Past efforts have focused on Step 1 (e.g. collecting performance data stratified by race, ethnicity, and language) or Step 4 (designing a specific intervention). Our roadmap highlights that these are crucial steps, but will have limited impact unless the other steps are addressed. Effective implementation and long-term sustainability require attention to all six steps.

1) Recognize disparities and commit to reducing them

When health care organizations and providers realize there are disparities in their own practices,[18] they become motivated to reduce them.[19] Therefore, the Patient Protection and Affordable Care Act of 2010 makes the collection of performance data stratified by race, ethnicity, and language (REL) a priority.[20] Similarly RWJF's Aligning Forces for Quality Program initially focused its disparities efforts on the collection of REL data in different communities. The Institute of Medicine (IOM) recently recommended methods to collect REL data,[21] and groups such as the Health Research and Educational Trust (HRET) have developed toolkits to guide organizations in this effort.[22]

Besides race-stratified performance data, training in health disparity issues (e.g., through cultural competency training) may help providers identify and act on disparities in their own practices. However, while cultural competency

Table 1. Six Steps for Reducing Racial and Ethnic Disparities in Care

1) Recognize disparities and commit to reducing them
   a. Stratify performance data by race, ethnicity, and language
   b. Provide disparities training for providers and staff

2) Implement a basic quality improvement structure and process
   a. Create a culture of quality
   b. Designate a quality improvement team
   c. Establish a quality improvement process
   d. Set goals and metrics
   e. Select a local champion
   f. Obtain leadership support

3) Make equity an integral component of quality improvement efforts
   a. Recognize equity as a cross-cutting dimension of quality
   b. Ensure that disparities efforts are not marginalized

4) Design the intervention(s)
   a. Determine root causes of disparities in specific context
   b. Consider six levels of influence: patient, provider, microsystem, organization, community, policy
   c. Review existing literature
      (1) Robert Wood Johnson Foundation - Interventions database, systematic reviews (www.solvingdisparities.org)
      (2) Agency for Healthcare Research and Quality - Health Care Innovations Exchange (www.innovations.ahrq.gov/), forthcoming Evidence-Based Practice Center Review
      (3) Veterans Administration - forthcoming review
   d. Learn from peer organizations
   e. Use evidence-based strategies
      (1) Multifactorial interventions that address key drivers of disparities
      (2) Culturally targeted interventions
      (3) Team-based care
      (4) Patient navigation
      (5) Work with families and non-health care partners
      (6) Interactive, skills-based training for patients rather than passive, didactic education
   f. Consider specific types of interventions (Table 3)

5) Implement, evaluate, and adjust the intervention(s)
   a. Consider implementation models such as the Consolidated Framework for Implementation Research
   b. Consider best practices (Table 4)
   c. Evaluate and adjust intervention

6) Sustain the intervention(s)
   a. Institutionalize intervention
   b. Create financial model

training and stratified performance data may increase the readiness of providers and organizations to change their behavior,[19] these interventions will need to be accompanied by more intensive approaches to ameliorate disparities. Sequist et al. found that cultural competency training and performance reports of the quality of diabetes care stratified by race and ethnicity increased providers' awareness of disparities, but did not improve clinical outcomes.[23] Therefore, our roadmap for reducing disparities highlights the importance of combining REL data collection with interventions targeted towards specific populations and settings.

2) Implement a basic quality improvement structure and process

Interventions to reduce disparities will not get very far unless there is a basic quality improvement structure and process upon which to build interventions.[24,25] Basic elements include a culture where quality is valued, creation of a quality improvement team comprised of all levels of staff, a process for quality improvement, goal setting and metrics, a local team champion, and support from top administrative and clinical leaders. If robust quality improvement structures and processes do not exist, then they must be created and nurtured while disparities interventions are developed.

3) Make equity an integral component of quality improvement efforts

For too long, disparities reduction and quality improvement have been two different worlds. People generally thought about reducing disparities separately from efforts to improve quality, and oftentimes different people in an organization were responsible for implementing disparity and quality initiatives. A major development over the past decade is the increasing recognition that equity is a fundamental component of quality of care. Efforts to reduce disparities need to be mainstreamed into routine quality improvement efforts rather than being marginalized.[26] That is, we need to think about the needs of the vulnerable patients we serve as we design interventions to improve care in our organizations, and address those needs as part of every quality improvement initiative. The Institute of Medicine's *Crossing the Quality Chasm* report stated that equity was one of six components of quality,[27] and the IOM's 2010 report *Future Directions for the National Healthcare Quality and Disparities Reports* highlighted equity further by elevating it to a cross-cutting dimension that intersects with all components of quality care.[28] Major health care organizations have instituted initiatives that promote the integration of equity into quality efforts including the American Board of Internal Medicine (Disparities module as part of the recertification process), American College of Cardiology (Coalition to Reduce Racial and Ethnic Disparities in Cardiovascular Disease Outcomes [CREDO] initiative),[29] American Medical Association (Commission to End Health Care Disparities), American Hospital Association (Race, ethnicity, and language data collection),[22] Joint Commission (Advancing Effective Communication, Cultural Competence, and Patient- and Family-Centered Care: a Roadmap for Hospitals),[30] and National Quality Forum (Healthcare Disparities and Cultural Competency Consensus Standards Development). For many health care organizations and providers, this integration of equity and quality represents a fundamental change from generic quality improvement efforts that improve only the general system of care, to interventions that improve the system of care and are targeted to specific priority populations and settings.

4) Design the intervention(s)

While several themes have emerged regarding successful interventions to reduce health care disparities based on our systematic reviews and grantees, solutions must be individualized to specific contexts, patient populations, and

Table 2. Levels of Influence of an Intervention

Intervention Level	Definition	Examples
Patient	Change the knowledge and/or behaviors of patients to improve their health outcomes	Symptom monitoring Incentives Culturally targeted education and outreach Self-management and goal setting Patient narratives
Provider	Change the knowledge and/or behavior of providers to improve patient outcomes	Cultural competency training Disparity report cards
Microsystem	Add new members to or shift responsibilities among the immediate care team, such as the primary care provider, nurse, and staff	Integration of community health workers or other staff into the care team Nurse-led interventions
Organization	Change organization operations; may require coordination among management, providers, information technology, and/or human resources	Redesigning the system of operations Instituting new forms of technology Improving the clinical encounter Systematic literacy screening of patients
Community	Work with people and organizations outside traditional health settings such as churches, schools, and social service agencies	Engaging local stakeholders to integrate community and health care resources
Policy	Influence laws, regulations, and/or resource allocation on a regional or national basis	Medicare reimbursement regulations Accreditation standards for providers and health care organizations Breast cancer screening laws

organizational settings.[31] For example, solutions for reducing diabetes disparities for African-Americans in Chicago may differ from the answers for African-Americans in the Mississippi Delta. We recommend determining the root causes of disparities in the health care organization or provider's patient population and designing interventions based on a conceptual model that targets six levels of influence: patient, provider, microsystem, organization, community, and policy (Table 2).[8,9] Each level represents a different leverage point that can be addressed to reduce disparities. The relative importance of these levels may vary across diverse organizations and patient populations.

Specific intervention strategies can then be developed to target different levels of influence. Table 3 offers an overview of strategies identified through the review of approximately 400 disparities intervention studies, including the 33 Finding Answers projects and 12 systematic literature reviews. Common intervention strategies include delivering education and training, restructuring the care team, and increasing patient access to testing and screening. About half of the interventions targeted only one of the levels of influence described above; most efforts were directed at patients in the form of education or training. Research evaluating pay-for-performance, on the other hand, was scant and requires further attention, especially given current interest in incentive-based programs. Going forward, Finding Answers aims to categorize each of the approximately 400 studies by level of influence and strategy, and to identify which combinations are promising for disparities reduction.

Organizations can find practical resources and promising intervention strategies on the Finding Answers website (www.solvingdisparities.org) or the Agency for Healthcare Research and Quality (AHRQ) Health Care Innovations Exchange (www.innovations.ahrq.gov). Systematic reviews such as those by Finding Answers and forthcoming ones from the AHRQ Evidence-Based Practice Center Program and the Veterans Administration can inform what types of interventions are most appropriate in different situations. In addition, organizations can learn about successful projects from peers through learning collaboratives,[24] site visits, case studies, and webinars.

While there is no silver bullet to reduce disparities, successful interventions reveal important themes. As previously noted, we looked across 12 systematic reviews of the literature and identified promising practices that can inform the design of future disparities interventions.[2–6,11–17] These include culturally tailoring programs to meet patients' needs, patient navigation, and engaging multidisciplinary teams of care providers in intervention delivery. Effective interventions frequently target multiple leverage points along a patient's pathway of care and actively involve families and community members in the care process. Additionally, successful health education programs often incorporate interactive, skills-based training for minority patients.

5) Implement, evaluate, and adjust the intervention(s)

The National Institutes of Health recently held its fifth annual conference on the science of dissemination and implementation to promote further research in this field, create opportunities for peer-to-peer learning, and showcase available models and tools. One such model is the Consolidated Framework for Implementation Research (CFIR), for which Damschroder et al. reviewed conceptual models of relevant factors in implementing a quality improvement intervention and synthesized existing frameworks into a single overarching model.[32] The CFIR covers five domains: intervention characteristics (e.g. relative advantage, adaptability, complexity, cost), outer setting (e.g. patient needs and resources, external policy and

Table 3. Overview of Disparities Intervention Strategies

Intervention Strategy	Definition	Examples
Deliver education and training	Providing information, tools, and/or teaching skills.	Patient education in self-management Provider training in cultural competency Education via plays and skits Communication skills training Decision-making aid Prescribed diet/exercise Continuing Medical Education (CME)
Engage the community	Involving organizations and/or individuals outside the health care delivery setting.	Media education campaign Church-based care delivery School-based care delivery Health/Learning collaborative Coalition building/advocacy Outreach to households
Provide psychological support	Delivering therapy to promote healthy behavior and psychological well-being of patients, their partners, and/or their families.	Group therapy Partner counseling Family therapy Coping skills development Motivational interviewing Telepsychiatry Risk/harm reduction
Provide reminders and feedback	Prompting adherence to recommended care guidelines and sharing information about performance.	Patient reminder to schedule preventive care Provider reminder of care protocol Patient health maintenance card/health mini-record Performance report cards stratified by race, ethnicity, and language
Restructure the care team	Shifting responsibilities among members of the care team or adding members to the existing care team to enhance care delivery.	Nurse-led interventions Pharmacist consultation Increased involvement of primary care provider in specialty care Peer coach/peer educator Community/lay health workers Patient navigator
Improve language and literacy services	Improving communication among providers, specialists and/or patients.	Health literacy screening Enhanced interpreter services
Increase access to testing and screening	Addressing financial and logistical barriers to testing and screening.	Free screening Integrated screening Screen-and-Treat Rapid test results Risk assessment
Provide financial incentives	Offering money or free/subsidized goods or services to influence behavior.	Vouchers for care Reduced out-of-pocket expenses Free give-aways Pay for performance
Cultural targeting	Customizing the content, approach, or messaging of an intervention based on characteristics of the population receiving care.	Culturally targeted education materials Patient-provider racial/ethnic concordance Religious messaging
Use technology	Using computerized or information technology-assisted tools to improve care.	Home biomarker measurement transmitted to clinic Peer storytelling on DVDs Remote video language interpretation Computerized reminders Computer kiosks in clinic waiting room Interactive computerized education/counseling
Other	Intervention strategies that did not meet the criteria defined above.	Home-based care Clinic open door policy Increased referrals/streamlined referral systems

incentives), inner setting (e.g. culture, implementation climate, readiness for implementation), characteristics of the individuals involved (e.g. knowledge and beliefs about the intervention, self-efficacy, stage of change), and the process of implementation (e.g. planning, engaging, executing, evaluating). Too often organizations focus on the content of an intervention without planning its implementation in sufficient detail. A model such as CFIR supplies a checklist of factors to consider in implementing an intervention to reduce disparities.

Through work with our 33 grantees, we have developed a series of best practices for implementing interventions to reduce disparities. These lessons were pulled from detailed qualitative data gathered through the Finding Answers program, and represent perspectives from organization leadership, providers, administrators, and front-line staff. We found common implementation challenges and solutions across health care settings. Table 4 summarizes best practices for disparities reduction efforts, provides the rationale and expected outcomes, and offers recommended strategies for delivering a high-quality equity initiative.

Implementation is an iterative process and organizations are unlikely to get the perfect solution on their first

Table 4. Best Practices for Implementing Interventions to Reduce Racial and Ethnic Disparities in Health Care

Practice	Rationale	Possible Strategies	Outcome
Assess organizational capacity	Interventions are more likely to succeed if the organization as a whole is ready for change.	Assess institutional resources (e.g. trained staff, materials, technology platforms) and match them with the needs of the intervention.	Organizations are equipped to implement and sustain the intervention.
		Ensure ongoing financial support.	
Foster a culture of equity	Success is more likely if staff recognize that disparities exist within the organization and view inequality as an injustice that must be redressed.	Institute systems to offer feedback to providers and incentivize disparities reduction.	Staff shares a definition of equitable care and places high value on its delivery.
		Explicitly define equitable health care as a goal in mission statements.	
		Build a work force that reflects the diversity of the patient population.	
Appoint staff to disparities reductions initiatives	A plan to improve equity requires human resources.	Consider quality improvement specialists and on-site equity champions to fill these roles. Mainstream equity into all quality improvement efforts.	Intervention is given adequate time and effort.
		Anticipate leadership and staff turn-over: e.g. cross-train staff; incorporate intervention training into staff orientation; include program responsibilities in job descriptions.	Staff is not overtaxed.
Identify and appeal to the equity rationale that is most important to your audience	Staff members are motivated for a variety of reasons:	Leverage staff motivation to support the program:	Buy-in across the organization is secured.
	Leadership may respond well to programs that guarantee a positive return on investment and leverage existing resources.	Present data that demonstrate potential for positive financial impact.	Consistent and accurate uptake of interventions is encouraged.
	Providers are often concerned with maximizing efficiency during the office visit.	Enhance the care team and promote care management outside of the clinic.	
	Front-line staff may be wary of impacting patient flow and room availability.	Minimize burden and show respect for staff time.	
	Everyone cares about patient outcomes.	Inspire enthusiasm to help patients.	
Incorporate disparities interventions into existing systems and anticipate ripple effects	New programs may create redundant efforts or conflicting goals with existing quality improvement initiatives.	Assess existing systems (e.g., electronic medical records) and identify opportunities for integration during the planning phase.	Workload and schedules are manageable. Disruptions and inconsistencies are minimized.
Involve members of the target population during program planning	Programs that are not culturally targeted risk rejection by patients.	Involve the target population in program design in a manner that is meaningful and inclusive.	Community engagement is advanced.
	Input by minority health workers is not a proxy for patient involvement.	Engage patients, not just minority health workers.	Programs are relevant and effective.
Strike a balance between adherence and adaptability	While adherence to protocol ensures consistency, flexibility is key when working with diverse patients.	Regularly collect process measures, identify opportunities for improvement, and adapt the intervention accordingly.	Programs are consistent, yet flexible.
		Use standardized checklists to monitor adherence.	
Be realistic about the time necessary to move the dial on disparities	Improvements in minority health take time because of multiple challenges inside and outside the clinic.	Plan long-term follow-up to demonstrate statistically significant improvements in health outcomes.	A realistic timeline manages expectations and maintains ongoing support.

attempt. Thus, evaluation of the intervention and adjustments to the program based on performance data stratified by race, ethnicity, and language are integral parts of the implementation process. Setting realistic goals is essential to accurately assess program effectiveness. Processes of care (e.g. measurement of hemoglobin A1c in patients with diabetes) generally improve more rapidly than patient outcomes (e.g. actual hemoglobin A1c value), and may therefore be better markers of short-term disparities reduction success, while outcomes could be longer-term targets.

6) Sustain the intervention(s)

Health care organizations, administrative leaders, and providers need to proactively plan for the sustainability of the intervention. Sustainability is dependent upon institutionalizing the intervention and creating feasible financial models. Too often interventions are dependent upon the initial champion and first burst of enthusiasm. If that champion leaves the organization or if staff tire after the early stages of implementation, then the disparities initiative is at risk for discontinuation. Institutionalization requires

promoting an organizational culture that values equity, creating incentives to continue the effort, whether financial and/or non-financial, and weaving the intervention into the fabric of everyday operations so that it is part of routine care as opposed to a new add-on (e.g. Step 3 in Table 1).

In the long-term, however, interventions must be financially viable. The business case for reducing disparities is evolving and must be viewed from both societal and individual organization/provider perspectives.[33–35] From a societal perspective, the business case for reducing disparities centers on direct medical costs, indirect costs, and the creation of a healthy national workforce in an increasingly competitive global economy. Laveist et al. estimate that disparities for minorities cost the United States $229 billion in direct medical expenditures and $1 trillion in indirect costs between 2003 and 2006.[36] America's demographics are becoming progressively more diverse. The United States Census Bureau estimates that by 2050, the Hispanic population will reach 30 %, the black population 13 %, and the Asian population 8 %.[37] Thus, from global and national economic perspectives, disparities reduction will become increasingly important if we are to have a healthy workforce that can successfully compete in the international marketplace and support the rapidly growing non-working aging population on the Social Security and Medicare entitlement programs.

From the perspective of the individual health care organization or provider, the immediate incentives are more complex. Integrated care delivery systems have an incentive to reduce disparities to decrease costly emergency department visits and hospitalizations. Large insurers are incentivized to provide high quality care for everyone to be more competitive in marketing their products to employers with increasingly diverse workforces. However, outpatient clinics and providers in the current, predominantly fee-for-service world, especially those serving the uninsured and underinsured, frequently do not have clear incentives to reduce disparities since the money saved from the prevented emergency department visit or hospitalization does not accrue to them.[34]

Currently, it is difficult to accurately predict the results of health care reform and efforts to contain the Medicare and Medicaid budgets, but several trends indicate that organizations would be wise to integrate disparities reduction into their ongoing quality improvement initiatives. Major national groups such as the Department of Health and Human Services (HHS), Agency for Healthcare Research and Quality, Centers for Disease Control (CDC), Centers for Medicare and Medicaid Services, and Institute of Medicine have consistently stressed the importance of reducing health care disparities and using quality improvement as a major tool to accomplish this goal.[28,38–42] The Affordable Care Act emphasizes collection of race, ethnicity, and language data.[20] Private demonstration projects, such as the Robert Wood Johnson Foundation Aligning Forces for Quality Program,[7] aim for multistakeholder coalitions of providers, payers, health care organizations, and consumers to improve quality and reduce disparities on regional levels. Intense policy attention has been devoted to accountable care organizations,[43] the patient-centered medical home,[44] and bundled payments.[45] These organizational structures and financing mechanisms emphasize coordinated, population based care that may reduce disparities.

Reducing racial and ethnic disparities in care is the right thing to do for patients, and, from a business perspective, health care organizations put themselves at risk if they do not prepare for policy and reimbursement changes that encourage reduction of disparities. We believe that health care organizations and providers would be imprudent if they did not plan for payment and coverage possibilities such as:

1) Incentives and reimbursements for team-based care. Team-based care is one of the most consistently successful types of disparities interventions,[9] but current payment mechanisms often do not create viable business models for sustainability. We believe that it is likely that future policies encouraging efficiency will increasingly reimburse or incentivize team-based care management activities; reimburse or incentivize use of non-physician members of the team, such as community health workers, peer educators and patient navigators; and ensure that downstream savings from care teams, such as averted hospitalizations and emergency department visits, flow back to those that generated the savings.
2) Implementation of pay-for-performance programs for reducing racial and ethnic disparities. Pay-for-performance is likely to become part of efforts to move from paying for volume to paying for quality. It will be important to incorporate safeguards such as pay-for-improvement to avoid cherry picking of easy patients, patient dropping, and harming of poorly resourced organizations caring for predominantly vulnerable populations.[16]
3) Incentives to create linkages between community and health care system. The new CDC Health Disparities and Inequalities Report and HHS National Strategy for Quality Improvement in Health Care exemplify the rise of combined public health—health care approaches to reduce disparities.[39,41,46] Integration of community health workers and other peer-based programming into the health care team shows potential,[4,12] and there is evidence that directly involving families, schools, and community-based organizations in health care interventions can improve health outcomes.[17]

CONCLUSION

As outlined in our roadmap, it is critical to create an organizational culture and infrastructure for improving

quality and equity. Organizations must design, implement, and sustain interventions based on the specific causes of disparities and their unique institutional environments and patient needs. To be most effective, all of these elements eventually need to be addressed; [24] however, we do not want to encourage paralysis for those who might perceive a daunting set of obstacles to overcome. Instead, our experience has been that it useful for an organization to start working on disparities by targeting whatever step or action feels right to them and is thus a priority.[46] Eventually the other steps will need to be addressed, but reducing disparities is often a dynamic process that evolves over time. While more disparities intervention research is needed, we have learned much over the past 10 years about which approaches are likely to succeed. The time for action is now.

Acknowledgements:
Contributors: *We would like to thank Melissa R. Partin, PhD, who served as the JGIM Deputy Editor for the six manuscripts in this Special Symposium: Interventions to Reduce Racial and Ethnic Disparities in Health Care. Dr. Partin provided valuable advice and feedback throughout this project. Marshall H. Chin, MD, MPH, and Amanda R. Clarke, MPH, served as the Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change Systematic Review Leadership Team that oversaw the teams writing the articles in this symposium.*

Funding Source: *Support for this publication was provided by the Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change Program. The Robert Wood Johnson Foundation had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, approval, or decision to submit the manuscript for publication.*

Prior Presentations: *Presented in part at the Society of General Internal Medicine Midwest Regional Meeting, September 23, 2010, Chicago, Illinois; the Society of General Internal Medicine Annual Meeting, May 5, 2011, Phoenix, Arizona; the American Public Health Association Annual Meeting, November 1, 2011, Washington, D.C.; and the Institute for Healthcare Improvement Annual National Forum, December 4, 2011, Orlando, Florida.*

Conflict of Interest: *The authors report no conflicts of interest with this work. Dr. Chin was also supported by a National Institute of Diabetes and Digestive and Kidney Diseases Midcareer Investigator Award in Patient-Oriented Research (K24 DK071933), Diabetes Research and Training Center (P60 DK20595), and Chicago Center for Diabetes Translation Research (P30 DK092949).*

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Health Promot Pract 2014 15: 29S
DOI: 10.1177/1524839914532649

The online version of this article can be found at:
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Expanding and Sustaining Integrated Health Care–Community Efforts to Reduce Diabetes Disparities

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To reduce racial and ethnic disparities in diabetes care and outcomes, it is critical to integrate health care and community approaches. However, little work describes how to expand and sustain such partnerships and initiatives. We outline our experience creating and growing an initiative to improve diabetes care and outcomes in the predominantly African American South Side of Chicago. Our project involves patient education and activation, a quality improvement collaborative with six clinics, provider education, and community partnerships. We aligned our project with the needs and goals of community residents and organizations, the mission and strategic plan of our academic medical center, various strengths and resources in Chicago, and the changing health care marketplace. We use the Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change *conceptual model and the Consolidated Framework for Implementation Research to elucidate how we expanded and sustained our project within a shifting environment. We recommend taking action to integrate health care with community projects, being inclusive, building partnerships, working with the media, and understanding vital historical, political, and economic contexts.*

Keywords: *diabetes; disparities; quality of care; race; intervention; equity*

Health Promotion Practice
November 2014 Vol. 15, Suppl 2 29S–39S
DOI: 10.1177/1524839914532649
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INTRODUCTION

The causes of diabetes disparities are multifactorial and complex, and thus solutions need to target different drivers (Peek, Cargill, & Huang, 2007). Patients need access to care, health care must be tailored to the individual needs of each patient, and providers have to prescribe the right therapies to get glucose, blood pressure, and cholesterol under control (American Diabetes Association, 2014). But diabetes care is largely self-management by patients in their homes and communities (American Association of Diabetes Educators, 2011). Healthy lifestyle is crucial, including good nutrition, physical activity, and actively implementing treatment

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Authors' Note: *Supported by NIDDK R18 DK083946-01A1, and Chicago Center for Diabetes Translation Research (P30 DK092949). Dr. Chin was also supported by a National Institute of Diabetes and Digestive and Kidney Diseases Midcareer Investigator Award in Patient-Oriented Research (K24 DK071933). Address correspondence to Marshall H. Chin, Section of General Internal Medicine, University of Chicago, 5841 South Maryland Avenue, MC 2007, Chicago, IL 60637, USA; e-mail: mchin@medicine.bsd.uchicago.edu.*

Supplement Note: *This article is part of a journal supplement entitled "The Alliance to Reduce Disparities in Diabetes: Infusing Policy and System Change with Local Experience." The supplement was supported by a grant to the Society for Public Health Education from the Merck Foundation. The Merck Foundation had no role in the development, writing, editing, review, or approval of the content of any of the articles in this issue.*

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regimens. Thus, diabetes is a classic model for chronic disease management and presents a prime case study of how to integrate care in the health care system with patients' lives in their homes and communities (Peek, Ferguson, Bergeron, Maltby, & Chin, 2014).

There are new incentives to integrate health care and community approaches to diabetes treatments. Health care policy and market forces are evolving and include population management, global payment systems, new delivery systems, and tax laws requiring nonprofit health care organizations to demonstrate community benefit. For example, as part of the Affordable Care Act, accountable care organizations (ACOs) are responsible for caring for a defined population within a geographic area, reaching budgetary goals to share savings, and meeting performance standards (Fisher & Shortell, 2010). ACOs have incentives to partner with community-based organizations in order to improve chronic care management and prevent costly hospitalizations and emergency department visits.

BACKGROUND

Although several initiatives have integrated individual health care and community interventions to reduce diabetes disparities (Peek, Ferguson, Bergeron, et al., 2014), few papers discuss how such projects can expand and spread. One comprehensive example is the Racial and Ethnic Approaches to Community Health Program's Charleston and Georgetown Diabetes Coalition in South Carolina (Jenkins et al., 2010; Jenkins, Myers, Heidari, Kelechi, & Buckner-Brown, 2011). The coalition educated patients, providers, and community members; implemented quality improvement strategies within health systems; and promoted sustainability with media and social organizing. Community health advisors followed up with patients who missed appointments, linked them to medication assistance and diabetic supplies, and provided grocery store tours and support groups in the community. The Coalition increased healthy food options, developed walking pathways, and advocated for policies that promote good health.

Another example is the translation of the Diabetes Prevention Program from academic medical centers into YMCAs. A modified Diabetes Prevention Program was successfully implemented in YMCAs across 46 communities in 23 states at a lower cost per participant compared to the original intervention. The investigators attributed this successful translation and expansion to collaboration, community-based delivery, health information technology, and payment systems that align incentives (Vojta, Koehler, Longjohn, Lever, & Caputo, 2013).

Given the limited number of prior papers and the evolution toward caring for populations such as with ACOs, there is a great need for more case studies of how initiatives that integrate health care and community approaches to reduce diabetes disparities can expand and spread. The factors and context that lead to successful expansion and sustainability of integrated diabetes disparities reduction efforts are not well known (Peek et al., 2007; Peek, Ferguson, Bergeron, et al., 2014). Therefore, we describe our experience implementing a collaborative effort to reduce diabetes disparities on the South Side of Chicago and how we connected with others to expand and sustain these efforts.

METHOD

Overview

We describe our initiative and then map its components to the six-level conceptual model for reducing disparities of the Robert Wood Johnson Foundation (RWJF) Finding Answers: Disparities Research for Change Program (Figure 1; Chin & Goldmann, 2011; Chin, Walters, Cook, & Huang, 2007) and the domains of the Consolidated Framework for Implementation Research (CFIR; Table 1; (Damschroder et al., 2009). As a validity check, we asked 16 stakeholders to review the article, including leadership at the University of Chicago, providers and staff of participating clinics, and directors of community organizations. The stakeholders confirmed the narrative and suggested minor editorial changes that have largely been incorporated.

RESULTS

Demographic and Institutional Context

The Challenge of Diabetes on the South Side of Chicago. The South Side of Chicago bears a high burden of diabetes. For example, residents of predominantly African American neighborhoods in Chicago such as the South Side have 5 times the rate of amputation as people living in primarily White neighborhoods (Feinglass, Abadin, Thompson, & Pearce, 2008). The South Side has many challenges, including food deserts (Illinois Advisory Committee to the United States Commission on Civil Rights, 2011) and neighborhoods where violent crime often deters recreational physical activity (Evenson et al., 2012). The health care system is relatively unintegrated.

Urban Health as a Priority of the University of Chicago. The Dean of the Biological Sciences Division

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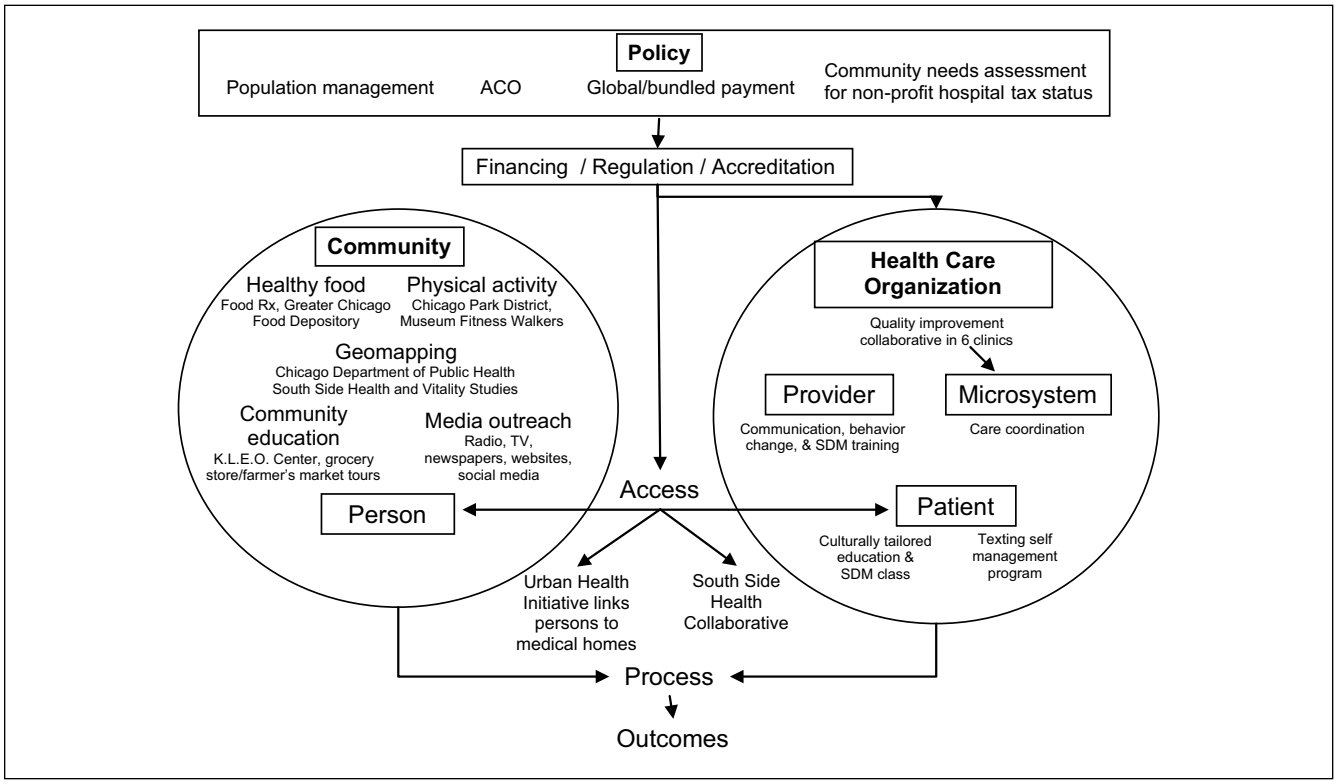


FIGURE 1 Components of the Intervention to Improve Diabetes Care and Outcomes on the South Side of Chicago
NOTE: ACO = accountable care organization; SDM = shared decision making. Components superimposed on the Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change conceptual framework for reducing disparities and a model for six levels of intervention: patient, provider, microsystem, organization, community, and policy (Chin & Goldmann, 2011; Chin, Walters, Cook, & Huang, 2007)

and Michelle Obama, the former Vice President for Community and External Affairs at the University of Chicago Medical Center, created an Urban Health Initiative (UHI) in 2005 whose mission was to improve the health of South Side residents through better integration and collaboration among the University of Chicago and other South Side health resources. The initiative built what is now called the South Side Healthcare Collaborative (SSHC), a network of currently more than 30 health centers, clinics, doctor's offices, and hospitals. The network aimed to improve access to care and target the right level of care for individual patients. For example, the initiative hoped to link patients who visited the emergency department and did not have a primary care physician to one of the clinics in the SSHC. The strategic initiative aimed to integrate care within the existing financial incentives (Hill & Madara, 2005). For example, Medicaid is the best payor for federally qualified health centers (FQHCs), whereas academic medical centers would receive approximately one fourth the reimbursement if the same patient sought primary care there. Thus, the current public reimbursement system incentivizes Medicaid patients to receive primary care in FQHCs. In 2007, President Robert Zimmer of the University of Chicago announced that urban health and urban education would be the two top community priorities of the University of Chicago (Thompson, 2007).

Diabetes Disparities Research at the University of Chicago. Our investigative team at the University of Chicago had previously engaged in multiple lines of research that provided a broad and deep foundation for subsequent ambitious partnerships. This research includes quality improvement collaboratives with diabetes such as the Health Resources and Services Administration's Health Disparities Collaboratives (Chin, 2010), formative work guiding tailoring of diabetes education and shared decision-making programs for African Americans (Peek et al., 2008; Peek et al., 2009, 2010), and a series of

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TABLE 1
Factors Influencing Implementation, Expansion, and Sustainability of Initiative to Improve Diabetes Care and Outcomes on the South Side of Chicago[a]

Intervention characteristics	
Source	• Quality improvement collaborative and care management techniques from the literature
	• Locally developed patient, health care, and community interventions based on interviews and collaboration with patients, clinics, and community groups
Relative advantage	• Does the right thing integrating health care and community approaches
	• Addresses social determinants of disparities
	• Emphasizes partnerships and collaborations
Adaptability	• Culturally tailored patient education and activation
	• Quality improvement interventions adapted to individual clinics
Complexity	• Difficult with many moving parts—key to reiterate big picture project vision to all partners and provide individual technical assistance and coaching
Costs	• Grant support helps defray costs at each clinic
	• Investment to develop skills, expertise, and systems necessary to thrive in new health care market
Outer setting	
External policy and incentives	• Population management, care coordination
	• Accountable care organizations
	• Global payment, bundled payment
	• Community needs assessment to maintain nonprofit hospital tax status
Peer pressure	• Competitive Chicago health care market
Cosmopolitanism	• University of Chicago community ties through Urban Health Initiative and research team
	• University of Chicago research collaborations with ACCESS Community Health Network and Chicago Department of Public Health
Patient needs and resources	• Alignment of project with priorities identified through University of Chicago's community needs assessment and prior qualitative studies with our patient population
Inner setting	
Culture	• University of Chicago—Mission of research, education, patient care, community service; increased focus on patient-centered care
	• Nonprofit community partners—Goals of community service and visibility
	• For-profit community partners—Goals of community service, visibility, and market share
Implementation climate	• University of Chicago
	○ Urban Health Initiative—Urban health as a priority
	○ New senior leadership updating organizational strategic plan to address population health and global budgeting
	○ Academic strength in diabetes, disparities, quality of care, community-engaged research
	○ Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change Program based at University of Chicago
Readiness for implementation	• In-kind support from University of Chicago and partners
	• Experience with multiple means of dissemination including traditional media and social media
Individuals	
Common goal	• Shared desire to improve patient and community health
Self-efficacy	• Patient classes in diabetes education, empowerment, and shared decision making
	• Clinic training in quality improvement and care coordination skills
Combined efforts	• Culture and commitment to interdisciplinary learning and collaboration
	• Comfort working in teams
	• Enthusiastic trainees across Chicago and the country from different disciplines
Process	
Planning	• Overarching strategy
	○ Diabetes project vision of integrating health care and community
	○ University of Chicago Urban Health Initiative
	• Individual quality improvement cycle planning
Engaging	• Quality improvement collaborative with six clinics
	• Community partnerships using principles of community-engaged research
	• Champions—Quality improvement team leaders, leaders of community partners, research team, senior University of Chicago leadership
Reflecting and evaluating	• Mixed-method evaluation covering clinical, organizational, and cost processes and outcomes

a. Domains based on the Consolidated Framework for Implementation Research (Damschroder et al., 2009)

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lifestyle modification programs for African Americans (Burnet et al., 2011; McNabb, Quinn, Kerver, Cook, & Karrison, 1997). In addition, team members had extensive experience in community-based participatory research and community collaborations (Choudhry et al., 2011). Team members had also recently completed a systematic review of interventions to reduce racial and ethnic disparities in diabetes (Peek et al., 2007). Thus, the team was poised for the right opportunity.

The Funding Opportunity and Match With Institutional Priorities

In 2008, the Merck Foundation released a call for proposals (CFP) for an Alliance to Reduce Diabetes Disparities. The Foundation would fund five sites that would attempt to reduce diabetes disparities by integrative approaches involving patient, provider, system, and community interventions (Clark et al., 2011). The CFP's goals closely matched the interests of the research team and UHI. In addition, although the UHI had begun some research projects, most notably the South Side Health and Vitality Studies (Lindau et al., 2011), it was seeking to support additional projects that combined research, service, and education. Also, several University research centers have community engagement and disparities reduction as priorities, including the Institute for Translational Medicine and National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Chicago Center for Diabetes Translation Research. These two centers have subcontracts with the ACCESS Community Health Network, a network of FQHCs that would eventually participate in the project. Staff from the UHI helped us identify four clinics from the SSHC that were potentially interested in participating in the project along with two clinics at the University of Chicago. The CFP asked for in-kind support, and the Dean of the Biological Sciences Division supported part of a project manager who would interface with the community as well as UHI staff that would assist the project. In addition, a newly recruited Director of a Center for Community Health and Vitality within the UHI had extensive experience with chronic disease quality improvement collaboratives involving clinics and became a member of our team. The UHI's effort to link patients who did not have regular medical homes to a primary care clinic or provider also fit the project. We were awarded the Merck Foundation grant and later received NIDDK funding.

Implementation of the Initiative

We have previously described the early experiences and outcomes of our project (Peek, Harmon, et al., 2012; Peek, Wilkes, et al., 2012). In brief, we partnered with six clinics and engaged in a quality improvement collaborative with integrative care management (Figure 1). Some patients received culturally tailored diabetes education and instruction in shared decision making. Providers received training in cultural competency, behavioral change, and shared decision making. Community partnerships were initially the least developed component of the project but rapidly expanded in exciting ways. Patients taking the culturally tailored diabetes education classes have improved their A1c (hemoglobin A1c) levels (Peek, Harmon, et al., 2012), clinics have improved their ability to provide chronic illness care (Peek, Wilkes, et al., 2012), and more persons in the community are aware of healthy lifestyles (Peek, Ferguson, Roberson, & Chin, 2014). Ongoing evaluations will assess longitudinal clinical outcomes (e.g., A1c, blood pressure, cholesterol), program costs, and reach into the community.

Expansion of the Initiative

Integration of Health Care and Community. Our community activities have focused on healthy lifestyle (Peek, Ferguson, Roberson, et al., 2014), and we have connected those efforts to our health care interventions (Peek, Wilkes, et al., 2012). Healthy eating is a priority. For example, we have partnered with the K.L.E.O. Community Family Life Center, a community-based organization that runs a monthly food pantry with the Chicago Greater Food Depository. We helped expand the pantry to incorporate health education, health screening, and sharing of culturally tailored recipes using food items distributed that day (Peek, Harmon, et al., 2012). Patients in our diabetes education and empowerment classes are encouraged to go to the K.L.E.O. food pantry, and vice versa, community residents at the pantry without a regular doctor are referred to the SSHC to establish primary care. Another example of health care/community integration is the Food Rx program, a collaboration that we developed with Walgreens pharmacy and the 61st Street Farmer's Market to increase access to healthy foods on the South Side of Chicago in food desert areas (Goddu, Roberson, Raffel, Chin, & Peek, in press). Physicians can prescribe "food prescriptions" that recommend specific dietary goals (e.g., low fat, low carbohydrate) and have a redeemable cash value (coupon or voucher) for healthy food at participating Walgreens locations or the farmer's market (Walgreens, 2011).

In addition, our Chicago Center for Diabetes Translation Research is partnering with the Chicago

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Department of Public Health on collaborative efforts to improve diabetes outcomes in the city. The Chicago Department of Public Health and our team have developed methods to generate diabetes hospitalization rate estimates at the Chicago neighborhood level from data that are geocoded only at the level of U.S. postal zip code (Jones, Maene, Peek, & Huang, 2013). These results and the ability to map estimates for small areas will help target interventions to reduce diabetes disparities.

Dissemination, Media Outreach, and Social Media. We have used multiple venues to inform people about our project and disseminate lessons learned. Traditional dissemination methods have included academic articles and presentations at national academic meetings, as well as community venues such as local community newspapers, community presentations, and other community-based health events (e.g., Chicago Black Women's Expo). Once we had early successes, the University of Chicago communications team then used many of its internal publications (e.g., magazines, newsletters) and websites to get the word out about our project as a strong example of university–community partnership. Further outreach and word of mouth led to dissemination on local cable television and South Side radio stations. For example, for a modest fee we purchased a time slot for a 13-part diabetes education and viewer call-in show on Chicago CAN-TV, a local cable television station that reaches 1 million viewers. We invited clinicians from our participating clinics and the University of Chicago to give television talks, thus getting them more involved. We connected with a popular local African American television talk show host, Jacinda Lockett, and appeared on her show (http://thejacindashow.com/Home.html). Jacinda subsequently did a feature on one of our events, the Diabetes Cook-Off, that highlights community-created healthy recipes. We have appeared numerous times on health interview and call-in shows on WVON, a popular radio station on the South Side. In addition, we created a website (www.southsidediabetes.org) for multiple audiences, including patients, researchers, and new potential partners. Over the past 12 months, our website has had 5,229 visits from 3,100 unique visitors. We also cross-linked the website to our partners (e.g., participating clinics, UHI, Finding Answers, SouthSideHealth.org, and DondeEsta.org) to highlight and celebrate the network we helped build, and created a project logo and brand to enhance the community's awareness of our work. We also shared information about our project on the Chicago Center for Diabetes Translation Research website (www.chicagodiabetesresearch.org). We have used social media, including Facebook (https://www.facebook.com/improvingdiabetes), Twitter (https://twitter.com/SSide_Diabetes), and several blogs. Our project was recently highlighted in the American Diabetes Association's *Diabetes Forecast* magazine for the lay public (Schugam, 2013).

Sustainability

Becoming Part of Standard Operating Procedure. We have continuously tried to transition the coordination and implementation of successful project components to community members and staff at our participating health centers, with the goal of incorporating these resources into their standard operating procedures. Our clinic sites are assuming increasing administrative responsibility with each round of our patient empowerment classes, and one of our sites is now implementing the class without support from our research team. One way our team has helped clinics incorporate these programs into standard operating procedure is by using quality improvement methods. For example, some clinics have tried adding referral to the patient class via their electronic medical record, and some have attempted to increase class retention by assigning medical assistants to keep in touch with a small group of patients about attendance.

We have collaborated with a certified diabetes educator to lead monthly tours at Save-A-Lot grocery stores on budget-friendly healthy eating, and over the past year we have trained more than 30 community members to lead nutrition-focused educational tours in South Side community settings (i.e., Save-A-Lot, farmer's markets, etc.). We are also creating infrastructure and protocols to support expansion. For example, we are collaborating with an alliance of churches on the South Side to write a guide that will help them set up food pantry and health education events similar to the ones we created at K.L.E.O.

Infusion of New Talent and People. The project attracts many students and volunteers. We have hosted students in nursing, public health, the culinary arts, and medicine, including trainees from college students to research fellows. They hail from diverse institutions, including Chicago State University (which graduates the largest number of minority health students in Illinois), Kennedy-King Community College, Malcolm X Community College, the University of Illinois at Chicago, and medical colleges from around the country. Most of the University of Chicago Pritzker School of Medicine first-year medical students participate in the National Institutes of Health–funded Summer Research Program after their first year of school, and many students have been eager to engage in community projects. The medical school also requires students to complete a longitudinal

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scholarly project throughout medical school, and community health is represented as one of the five scholarly pathways that students can choose to participate in. Even the legal team at the University of Chicago has been very enthusiastic and helpful, using our project to develop legal templates and approaches for other community research and service collaborations.

Synergy With Other Disparity Programs. Our project shared several staff members with the RWJF Finding Answers: Disparities Research for Change National Program Office at the University of Chicago (www.solvingdisparities.org). Finding Answers has a national scope funding evaluations of disparities interventions, performing systematic reviews of the disparities intervention literature, and providing technical assistance to organizations attempting to reduce disparities. This collaboration allowed our local work to be informed by national trends and findings, while also helping the Finding Answers staff understand better the real-world challenges of implementing disparities interventions.

Finding Answers also provided a national venue to disseminate our lessons. For example, our project was one of the case studies in Finding Answers' training webinars for organizations attempting to reduce disparities. During one webinar, a group from Memphis became intrigued with our Food Rx program, and we helped them contact their local Walgreens representative. In the summer-fall of 2012, Finding Answers embarked on a media campaign to disseminate information about its Roadmap to Reduce Disparities (Chin et al., 2012), and the South Side diabetes project was highlighted as one example of integrating health care and community approaches to reduce disparities (Chin, 2012; Devi, 2012). In addition, Finding Answers and members of our diabetes project team collaborated with the American Association of Medical Colleges to provide a workshop on reducing disparities by integrating equity into quality improvement at the national American Association of Medical Colleges Integrating Quality meeting. Finding Answers and our diabetes project have informed each other and created new opportunities for dissemination and shared learning.

Evolving Policy Trends and Financial Incentives. We focused on population management of a defined catchment area based on community needs assessments, scientific evidence, and prior experience. Serendipitously, our integration of health care and community approaches dovetailed with increasing national interest in global payment models and ACOs. An article describing our project's early experiences was accepted into a special diabetes issue of *Health Affairs* (Peek, Wilkes, et al., 2012), and our project's policy relevance has been one of the themes highlighted in the Merck Alliance's webinars on addressing diabetes disparities (Alliance to Reduce Disparities in Diabetes, 2013). We were invited to speak to the Commonwealth Fund Board of Directors about our project for this reason.

Like many academic medical centers, most of the University of Chicago's financial profit has historically come from providing tertiary and quarternary fee-for-service care and procedures. However, senior medical center leadership changed in 2011. Subsequently the organization's strategic and operating plans have been updated to prepare for an environment that incentivizes optimization of provider delivery models, population health, community benefit, and care coordination, and that will include innovative payment models that promote value. In addition, consistent with increasing national efforts in the Affordable Care Act and private sector to reduce racial and socioeconomic disparities in care, the University of Chicago has embarked on an aggressive Diversity and Inclusion initiative to improve equity in quality of care, patient outcomes and experience, and workforce diversity. Our team is actively involved in this local equity initiative.

The goals and content of our South Side Diabetes Project align well with the University of Chicago's new strategic and operating plans. For example, the six clinics in our project became a focal point of a proposal the University of Chicago submitted in response to a request for applications from the state of Illinois Medicaid agency for care coordination programs. The medical director of the participating university Primary Care Group clinic took the lead in writing the proposal, and she helped rally the clinics around this common vision. Medical Center leadership chose diabetes as the focus and used our collaborative team structure as the proposal's core given the experience, relationships, infrastructure, and groundwork that had been built.

Our project also aligned with the increasing national priority on patient-centered care. The University of Chicago Health Plan (UCHP) is a capitated health plan of university and medical center employees and dependents, many of whom live on the South Side. UCHP seeks to improve patient satisfaction and thus adopted a component of our project that used mobile phone texting technology to aid patients with diabetes self-management (Dick et al., 2011; Nundy et al., 2012; Nundy et al., 2014). UCHP assumed the full financial and administrative responsibility of the texting program after seeing the results of a pilot study involving 18 patients (Dick et al., 2011). This buy-in facilitated true integration of the program into clinical operations

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(e.g., using UCHP staff as care managers), increased scale (i.e., the program was made available to all UCHP members with diabetes), and enhanced sustainability. In addition, the University is aligning the priorities it identifies through its required community needs assessment with its community benefit and service efforts. Obesity, diabetes, and metabolic syndrome are significant health problems on the South Side, and thus our project fits well with the University's vision for community benefit programs. Finally, the University of Chicago maintains the multifactorial mission of patient care, research, education, and community service. Our project works in each of these four areas and provides trainees multiple ways to serve and improve their skills.

Mapping Project to the RWJF Finding Answers: Disparities Research for Change Conceptual Model for Reducing Disparities (Figure1) and the CFIR (Table 1). The Finding Answers Reducing Disparities model highlights that the causes of disparities are multifactorial, and thus the solutions need to address these different areas to be most effective (Chin et al., 2012). Persons with diabetes spend most of their time living in the community. Therefore, we have attempted to increase access to healthy food and safe physical activity, we have and educated the community and engaged in media outreach. Within the health care system, we have implemented culturally tailored diabetes education for patients, behavioral change training for providers, and a quality improvement collaborative for clinics to improve their care management. Policy makers will need to implement payment reform to make preventive medicine, primary care, and public health efforts to reduce disparities financially viable.

Whereas the Finding Answers model provides targets for intervention, the complementary CFIR implementation framework has five domains to help identify and understand key drivers that can expand and spread an intervention (Damschroder et al., 2009): (a) intervention characteristics (e.g., adaptable with cultural tailoring), (b) outer setting (e.g., aligning with policy and financial trends toward population management and accountability to communities), (c) inner setting (e.g., supporting the mission of the Medical Center's UHI), (d) individuals (e.g., providing a venue for enthusiastic trainees eager for community-based service and research), and (e) process (e.g., using principles of community-engaged research and rapid-cycle quality improvement). The table also includes the CFIR subdomains that are most relevant for our project. Successful expansion does not follow a simple linear process. A framework like CFIR helps highlight where a project has strengths for implementation and what gaps need attention.

DISCUSSION

Our project arose from community needs, our prior diabetes disparities reduction efforts, the local institutional environment, and the priorities of the Merck Foundation and NIDDK. Over time the project expanded, particularly in the integration of community partnerships and health care components. We designed our project to integrate health care and community because it was the right thing to do in order to effectively tackle diabetes disparities. However, over time we further aligned our specific interventions with major policy and financial trends in the health care marketplace and the evolving strategic priorities of the University of Chicago. We also explored multiple ways of expanding the project and invested in partnerships when we received positive feedback and found collaborative partners with shared goals and interests. The alignment of interests between community and University of Chicago across research, education, patient care, and community service has enabled us to expand and sustain our integrated diabetes disparities reduction initiative with the hopes of significantly improving the health of the South Side of Chicago.

We have encountered several challenges. The project has required significant investments of time, resources, and staff from our team. For example, team members have spent substantial time establishing and cultivating relationships with community organizations, local businesses, and politicians, and participating in university meetings with stakeholders in the medical center and broader university. They have also expended much effort in overseeing and coordinating volunteers and trainees. We were fortunate to receive grant funding and institutional support from the University and our partners, and some responsibilities for implementing the project have transitioned to the community and health centers. Realistically, however, financial incentives will need to align if integrated health care and community solutions to reduce diabetes disparities are to spread nationally.

Many staff, champions, and leaders have turned over in clinics, and that has required us to rebuild relationships and teams and navigate participants' shifting clinical and personal priorities. Expansion is difficult. Much of our work is successful because of the many personal touch-points we have, but that limits our expansion regarding depth and breadth. We have extended our reach with human capital (e.g., training

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community members) and technology (e.g., texting patients), but it is a challenge nonetheless.

CONCLUSIONS

We have learned many key lessons:

1. *Take action and do something* (Clark et al., 2011; Fawcett, Collie-Akers, Schultz, & Cupertino, 2013; Grigg-Saito et al., 2010; McCann, 2009). It is hard to get things going. Aspirational words are common but actual projects rare. People are happy to latch on to a moving train, even if it is slow at first. It may feel difficult to align so many stakeholders and set things up perfectly, but do not let that stop you. Start something, even if on your own. Expansion can build off small successes.
2. *Be inclusive. Be open to different partners and collaborations* (Clark et al., 2011; Jenkins et al., 2010; Jenkins et al., 2011; Spencer et al., 2011). We have developed collaborations with local, nonprofit organizations such as the 61st Street Farmer's Market, K.L.E.O. Community Family Life Center, and the Greater Chicago Food Depository, as well as national, for-profit companies such as Walgreens and the Save-a-Lot grocery chain. We have engaged undergraduates and the legal and communications departments. Keep an eye out for unlikely partners you might not have imagined, and actively search for unanticipated opportunities. Interests can align around improving community health.
3. *Include partnerships with established organizations with wide reach* (Clark et al., 2011; Grigg-Saito et al., 2010; Jenkins et al., 2010; Jenkins et al., 2011; Rice, Bain, & Collinsworth, 2012; Vojta et al., 2013). For example, our partnership with the RWJF Finding Answers program provided opportunities to disseminate our findings regionally and nationally.
4. *Gain skills in working with media and use local public relations staff* (Clark et al., 2011; Jenkins et al., 2010; Jenkins et al., 2011). Researchers usually have no or minimal training in media relations and often want to avoid any perception of self-aggrandizement. However, it is important to get the word out about your project to highlight key health issues and share your lessons. Opportunities often develop from there. Most academic centers have professionally trained public relations staff whose job it is to help researchers craft messages and work with media sources. Scientific journals are primarily read by scientists; expanding the reach of your work to ordinary citizens and policy makers can exponentially increase the real-world impact of your science.
5. *Understand historical, policy, and economic contexts* (Clark et al., 2011; Grigg-Saito et al., 2010; Jenkins et al., 2010; Jenkins et al., 2011; Rice et al., 2012). Understanding local and national contexts is critical for recognizing where interests align and what types of tailored programs best fit mutual partners. Participate on community committees, stay in the loop with your organization's strategic planning, and connect with policy makers and advisors.
6. *Do not be afraid to create an action-oriented, integrated health care–community project* (Clark et al., 2011; Fawcett et al., 2013; Grigg-Saito et al., 2010; McCann, 2009; Walton, Snead, Collinsworth, & Schmidt, 2012). Integrated projects are ambitious and require significant investment, but people are enthusiastic to support and work with a project that is doing the right thing. Such projects are good for the community, fit the missions of most organizations, and are the types of initiatives that people like to celebrate when an event goes well. These projects speak to the heart as well as mind. The new health care environment provides tremendously exciting opportunities to reduce disparities in care and improve community and population outcomes. Go for it!

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Health Policy 122 (2018) 837–853

Contents lists available at ScienceDirect

Health Policy

journal homepage: www.elsevier.com/locate/healthpol

Lessons for achieving health equity comparing Aotearoa/New Zealand and the United States

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ARTICLE INFO

Article history:
Received 16 December 2017
Received in revised form 30 April 2018
Accepted 5 May 2018

Keywords:
Equity
Inequity
Access to care
Quality of care
Outcomes
Payment

ABSTRACT

Aotearoa/New Zealand (Aotearoa/NZ) and the United States (U.S.) suffer inequities in health outcomes by race/ethnicity and socioeconomic status. This paper compares both countries' approaches to health equity to inform policy efforts. We developed a conceptual model that highlights how government and private policies influence health equity by impacting the healthcare system (access to care, structure and quality of care, payment of care), and integration of healthcare system with social services. These policies are shaped by each country's culture, history, and values. Aotearoa/NZ and U.S. share strong aspirational goals for health equity in their national health strategy documents. Unfortunately, implemented policies are frequently not explicit in how they address health inequities, and often do not align with evidence-based approaches known to improve equity. To authentically commit to achieving health equity, nations should: 1) Explicitly design quality of care and payment policies to achieve equity, holding the healthcare system accountable through public monitoring and evaluation, and supporting with adequate resources; 2) Address all determinants of health for individuals and communities with coordinated approaches, integrated funding streams, and shared accountability metrics across health and social sectors; 3) Share power authentically with racial/ethnic minorities and promote indigenous peoples' self-determination; 4) Have free, frank, and fearless discussions about impacts of structural racism, colonialism, and white privilege, ensuring that policies and programs explicitly address root causes.

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1. Introduction

The achievement of health equity remains an important but elusive goal. The World Health Organization (WHO) states that "*Equity* is the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically. *Health inequities* therefore involve more than inequality with respect to health determinants, access to the resources needed to improve and maintain health or health outcomes. They also entail a failure to avoid or overcome inequalities that infringe on fairness and human rights norms [1]." Braveman and colleagues argue that equity requires the removal of obstacles to health such as poverty, discrimination, powerlessness, and lack of access to good jobs with fair pay, quality education and housing, safe environments, and healthcare [2–4]. WHO's Commission on Social Determinants of Health notes the importance of all parts of government and the economy, and the need to coordinate policies to advance health equity [5]. Two of the 17 United Nations Sustainable Development Goals are good health and well-being, and reducing inequalities [6]. Specific health targets include universal health coverage, and access to quality healthcare services, medications, and vaccines. Key equity targets are to "ensure equal opportunity and reduce inequalities of out-

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https://doi.org/10.1016/j.healthpol.2018.05.001
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come, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard [6]."

Beyond human rights and social justice, compelling economic arguments support the pursuit of health equity. For example, the societal economic costs of health inequities between Māori and non-Māori children are estimated between $NZ62 million to $NZ200 million [7], and in the United States (U.S.) eliminating racial inequities would have saved over $1 trillion dollars 2003–2006 in direct medical costs, indirect costs such as lost productivity, and costs of premature deaths [8]. In addition, absenteeism and presenteeism incur major costs to businesses. Increasingly U.S. companies employ sociodemographically diverse workers and seek health plans that demonstrate they provide high quality care to all patients to enable a healthy workforce [9,10].

We compare Aotearoa/New Zealand (Aotearoa/NZ) and U.S. approaches to advance health equity to inform policy efforts. We contrast important drivers of inequities, and mechanisms and tools for solutions. Aotearoa/NZ and the U.S. have many fundamental similarities that increase applicability of lessons. Both countries are western democracies with health systems comprised of publicly and privately funded components, although of differing proportions. The largest racial/ethnic group is of settler European descent, and both countries struggle from colonialism and racism and associated adverse health consequences [11–13]. Both countries have broadly implemented neo-liberal policies and structures from the 1980s onwards, leading to increased privatization and a greater emphasis on personal responsibility with a concomitant reduction in state policy, regulation, and funding [14]. Neoliberalism may negatively impact social justice, and some have argued that the state must assure equity of opportunity [15]. The subsequent rising income inequality has been associated with decreased social capital and cohesion, increased stress, and poorer overall population health [16].

Yet, Aotearoa/NZ and the U.S. also have significant population and geographic differences, and fundamental differences in culture, history, and values. As of 2017, Aotearoa/NZ has 4.6 million residents compared to the U.S. population of 326.4 million [17], and Aotearoa/NZ is geographically 34 times smaller than the U.S. [18] The largest ethnic minority groups in Aotearoa/NZ are the indigenous Māori (14.9%), Asian (11.8%), and Pacific peoples (7.4%) [19], while in the U.S. the largest ethnic minority groups are Hispanic (17.8%), African-American (14.0%), and Asian (6.5%) [20]. Indigenous American Indians and Alaskan Natives (AIAN) comprise 1.7% and Native Hawaiians and Pacific Islanders 0.4% of the U.S. population [20].

This paper will focus on the healthcare system as well as on the integration of the healthcare system with social services [21,22]. While numerous important inequities exist across factors such as disability and refugee status, we will focus on race/ethnicity and socioeconomic status/socioeconomic deprivation. Intersectionality, the combination of intersecting systems of oppression that perpetuate discrimination and disadvantage based on factors such as race/ethnicity, class, sex, and gender identity [23], is frequently associated with worse outcomes than any one dimension of disadvantage [24]. Systems of discrimination and oppression cannot be completely understood in isolation [25]. Therefore, our paper will especially highlight issues for indigenous peoples and racial/ethnic minority population groups as they are more likely to experience disproportionate socioeconomic deprivation.

While multiple ethnic groups in Aotearoa/NZ suffer from important health inequities (Pacific peoples and Asians, among others), we will focus on pervasive Māori:non-Māori inequities because nous rights conferred by the Treaty to monitor government action and inaction around inequities are fundamental to the legal and moral existence and operation of Aotearoa/NZ. We analyze the Aotearoa/NZ system in more detail than the U.S. system because a more extensive literature exists about the latter.

2. Methods

2.1. Conceptual model

We developed a conceptual model that places policy levers to achieve health equity within cultural and historical contexts, building upon more detailed equity models and literature (Fig. 1) [3,5,27]. Our model identifies that health equity among more and less advantaged groups is affected by the healthcare system and fundamental social factors, including housing, education, employment, poverty, food insecurity, and the criminal justice system. Government and private policies that impact the healthcare system (access to care, structure and quality of care, and payment of care), social determinants of health, and the integration of the healthcare system with social services, are critical determinants of health equity. These policies are created in a political environment highly influenced by a country's underlying cultural and historical contexts, and predominant values.

We performed a narrative literature overview based on a broad and deep environmental scan of the components of the conceptual model [28–30], drawing upon health care, sociological, and historical literature. We analyzed and categorized this information by components of the model, and came to consensus on the objective descriptions of each nation's health systems and interpretation of their strengths and weaknesses. Health equity experts from both nations reviewed our paper. We discussed their feedback and incorporated those points that we believed were valid.

3. Results

3.1. Health inequities in Aotearoa/New Zealand and the United States

A large empirical literature in both countries documents significant health inequities across race/ethnicity and socioeconomic status for mortality, morbidity, quality of care, and patient experience [13,31–35]. In Aotearoa/NZ, life expectancy at birth is 75.1 years for Māori, and 82.1 years for non-Māori, a gap of 7.0 years [33]. When comparing least socioeconomically deprived to most deprived areas, life expectancy at birth was greater by 7.5 years in males and 6.1 years in females [36]. In 2013, over half of the entire Māori population (63.4%) lived in the most socioeconomically deprived deciles (7–10) [31]. In 2008 in the U.S., white men with 16 years or more of education lived 14.2 years longer than black men with fewer than 12 years of education [37]. In the Commonwealth Fund's 2017 international rankings of health equity in 11 Western countries, Aotearoa/NZ and the U.S. rank 8 and 11, respectively; 11 being the worst ranking [38].

3.2. Causes of health inequities in the context of history, culture, and values

Social determinants of health, including social and physical environments [39], and factors such as income, education, social cohesion, and neighborhood quality, explain most of the inequities in population health outcomes in both Aotearoa/NZ and the U.S.,

te Tiriti o Waitangi (the Māori version of the Treaty of Waitangi) between Māori and the British Crown in 1840 is the contractual relationship on which Aotearoa/NZ is founded [26]. Thus, indige-

with healthcare estimated to account for approximately 10% of the variation [40]. Colonialism, characterized by historical and contemporary dispossession, subjugation and forced assimilation, has

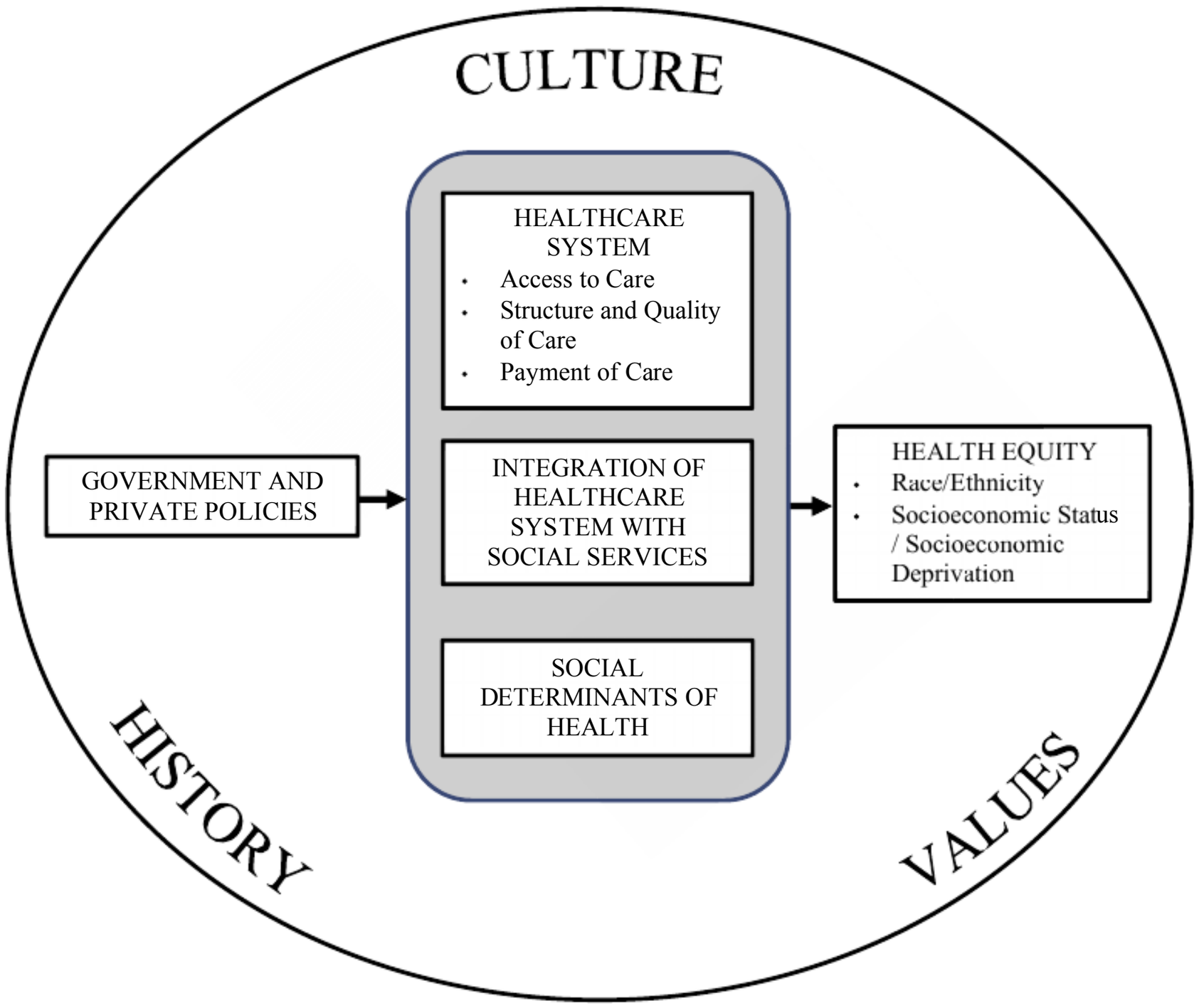


Fig. 1. Conceptual Model for Key Policies and Contexts Impacting Health Equity.

disrupted Māori culture and sovereignty with longterm deleterious effects similar to the experience of indigenous populations in the U.S. and globally [41,42].

Racial/ethnic minorities in both countries face bias and institutional and personally-mediated racism with associated serious health consequences [43–45]. Legalized racism manifested itself in the persecution, marginalization, and alienation of indigenous populations [46], the Reconstruction and Jim Crow eras in the U.S. [47], anti-Asian immigration laws [48,49], and discriminatory approaches to Latinos in the U.S. criminal justice and immigration systems [50]. The devastating effects of colonization continue to have adverse impacts on American Indians, Alaskan Natives, Native Hawaiians, and Pacific Islanders in the United States [51], as well as for Māori in Aotearoa/NZ. Over 50 pieces of Aotearoa/NZ legislation affecting sovereignty, land ownership, franchise, voting and culture have discriminated against Māori, forexample the 1862 and 1865 Native Land Acts which allowed settlers to acquire Māori land without consent from Iwi (nations) [52–54]. These examples highlight the structural racism that impact health through mechanisms such as substandard housing, education, employment, health care, and economic opportunity.

Both countries share numerous barriers to access and high quality care including low health literacy [55,56], limited cultural competence of providers, lack of transport, and inadequate childcare [13]. Out-of-pocket costs are significant barriers to access to care. Co-payments to general practitioners (GPs) in Aotearoa/NZ

private insurance packages (approximately one-third of the population), can gain access to diagnostic tests and surgical and medical procedures more quickly through the private sector than those who are solely reliant on the publicly-funded health sector [57].

Queue-jumping by the wealthy for earlier diagnosis may be an explanation for differences in patterns of hospital presentation for bowel cancer in Aotearoa/NZ. Of patients with colon cancer, 43% of people in the lowest (poorest) socioeconomic Aotearoa/NZ Deprivation (NZDep) quintile had their initial disease presentation at an emergency department, as opposed to within primary care, compared to 29% inthe highest quintile [58]. Forty-four percent of Māori and 51% of Pacific people diagnosed with colon cancer presented as an acute emergency, compared with 33% of non-Māori-non-Pacific people [58]. Among patients with cardiovascular disease, preventable deaths have occurred from lack of access to life-saving cardiac interventions and surgery [59,60].

Similarly, in the U.S., the uninsured and those with Medicaid insurance often have more difficulty accessing specialists and mental health providers, for reasons including a limited number of providers who will see these patients [61]. Delays in accessing primary and specialty care have adverse health consequences, including presenting with advanced stage cancer and having worse survival for some cancers [62,63].

In contrast, important historical, cultural, and geographic differences exist between Aotearoa/NZ and the U.S. that impact the nature of health inequities [64]. For example, the legacy of slavery

are unaffordable to some and the uninsured in the U.S. often rely on charity care. Although a greater proportion of health funding is from government's public funding in Aotearoa/NZ compared to the US, a two-tiered health system also exists in Aotearoa/NZ. The two-tiered system means the wealthier, and those who purchase

politically with seven Māori electorates that reserve positions to representatives of Māori in the Aotearoa/NZ Parliament [19,67]. There is also an ongoing history of independent Māori political party action [68].

The Treaty of Waitangi is purported to play a critical role in Aotearoa/NZ's history and culture. The Treaty is said to have formed the foundation of a contractual relationship between two internationally recognised sovereign nations – Māori, as tāngata whenua (people of the land) of Aotearoa/NZ, and the British Crown. The Treaty document is prominently displayed in national museums and commonly evoked in discussions around equity. However, it has a contentious history with significant differences in the Māori and English translations, and the Treaty was not formally recognised, or upheld, by many successive governments. Only the Māori version has consistently been recognised by Māori since 1840. This was the version that over five hundred Rangatira (chiefs) as representatives of their Iwi (nations) viewed, discussed and signed with British Crown signatories at Waitangi on February 6, 1840 [69]. The English version of the Treaty decrees the ceding of Māori sovereignty to the Crown. In contrast, the Māori version has no mention of this whatsoever. Māori political figures over the years, current legal experts and the Waitangi Tribunal (the Crown-introduced and determined mechanism by which Treaty grievances are investigated) all assert that Māori did not cede sovereignty to the British Crown in 1840 [52,70,71].

Post-Treaty Aotearoa/NZ underwent a period of wars and land confiscation similar to that experienced by American Indians. However, as a result of Māori sovereignty movements that have focused on Treaty rights, there has been some national responsibility at least since the mid-1970s to honor Māori protections in the Treaty [26]. From American historical and ethical perspectives regarding racial and ethnic minority populations, the Aotearoa/NZ experience resonates in different ways from broken U.S. governmental treaties with American Indians and the emphasis on individual rights in the American Civil Rights Act of 1964 [46,72]. For example, in his 1963 speech "Report to the American People on Civil Rights," rather than stressing legal obligations, President John F. Kennedy stated: "We are confronted primarily with a moral issue. It is as old as the scriptures and is as clear as the American Constitution. The heart of the question is whether all Americans are to be afforded equal rights and equal opportunities, whether we are going to treat our fellow Americans as we want to be treated" [72]. Discussing the right of African Americans to be served in a public restaurant, he declared "This seems to me to be an elementary right. Its denial is an arbitrary indignity that no American in 1963 should have to endure, but many do" [72].

3.3. Aspirations reflected in the national health strategies

Both countries share strong aspirations for health equity in their national health strategy documents that provide high-level frameworks and guidance for achieving health equity (Table 1) [73–78].

3.4. Actual National Policies, Regulations, and Incentives Affecting Health Equity for Aotearoa/New Zealand and the United States

list key national policies affecting health equity

in the U.S. [65], and the history of Hispanic/Latino colonization of and migration to the U.S. have complicated contexts with no direct parallel in Aotearoa/NZ [66]. Māori represent a greater percentage of the nation's population than American Indians, Alaskan Natives, Native Hawaiians and Pacific Islanders, and appear more visible

tions to Māori to improve health outcomes and reduce inequities with a view to eliminating them. However, in 2012, the Office of the Auditor General (OAG) found that "the combination of lack of information in the annual reports on Māori health needs and on targets to reduce disparities makes it hard to gauge DHBs' progress" [81]. The OAG revisited the issue in 2014 finding that performance had improved, but that several areas of concern remained, noting "several DHBs still needed to provide better information about the extent of disparities for their Māori population, the initiatives and programs to reduce disparities, and the progress that has been made in reducing those disparities" [82].

In addition, even though both countries have several equity-specific policies, the safety net is consistently underfunded and underresourced. For example, in 2012 the city of Chicago closed half of its mental health clinics for what patient advocates presumed to be budgetary reasons. Incarceration rates increased and now the Cook County Jail is one of the largest providers of mental health services in the U.S. at great expense to taxpayers [83].

3.4.1. Access to care

Aotearoa/NZ has a stronger safety net for access to care for citizens and permanent residents than the U.S., with publicly funded health and disability services for preventive, inpatient, outpatient, primary care, prescription drugs, mental healthcare, dental care for children, home support services and long-term residential care for older adults, and disability support (Table 2) [84,85]. Co-pays are generally required, but the proportion of the Aotearoa/NZ health expenditure that is private is approximately 20% (including levies to fund a national no-fault injury compensation scheme); about 80% being publicly funded [86]. Attempts in the U.S. to expand insurance coverage such as through the Affordable Care Act still fall far short of Aotearoa/NZ's floor coverage for residents [87]. However, compared to the U.S., the national healthcare budget in Aotearoa/NZ determined through the political process imposes a stricter cap on spending, which limits access through rationing and queuing for nonurgent services [57,88,89], and sometimes for urgent services [59]. New Zealanders with private insurance, and the wealthy, can largely bypass these queues. Migrant populations, including refugees, in both countries have limited eligibility for services [84].

Access to injury-related care and resources differs substantially across the two countries. The universal no fault Accident Compensation Corporation (ACC) in Aotearoa/NZ provides universal coverage for injuries including treatment costs for all residents and visitors to Aotearoa/NZ, and up to 80% of pre-injury earnings to Aotearoa/NZ residents [57,90]. ACC was introduced in the early 1970s to address inequities and perverse incentives associated with the previous litigious system for injury-related compensation. Despite ACC's universal entitlement, however, Māori experience inequities in access and outcomes [91]. The U.S. relies upon a patchwork set of less comprehensive federal and state workmen's compensation laws that vary substantially in coverage [92]. Victims of medical malpractice can sue for damages, but the tort system is inefficient. Only 2 percent of negligent injuries result in claims, and administrative expenses comprise 60% of total system costs [93].

Funding formulae impact the allocation of resources and access to care. Aotearoa/NZ explicitly adjusts for socioeconomic status and race/ethnicity in its national population-based funding for-

Tables 2–5

for access to care; integration of healthcare system with social services; structure and quality of care, and payment [79,80]. Overall, both countries have relatively few strong policies with support, incentives, and enforcement that are explicitly designed to achieve equity for racial/ethnic minority and socioeconomically deprived populations. In Aotearoa/NZ, District Health Boards (DHBs), legislated government-funded regional health organizations with responsibility for providing, planning and purchasing 80% of Aotearoa/NZ's healthcare services, have statutory obligamula for budgetary allocations to DHBs. Whilst it adjusts using the New Zealand Index of Deprivation (NZDep) which includes internet access, income, employment, education, home ownership, social support, living space, and access to a car [94,95], ethnicity (Māori, Pacific peoples, Other), rurality, and sex, the adjustment for age has the greatest impact through redistribution of resources to those ethnic groups with older population age structures (NZ European).

Primary care is funded by a combination of government capitation contributions (per enrolled patient), and fee-for-service (FFS).

About 30% of primary care practices in Aotearoa/NZ use the Very Low Cost Access (VLCA) funding that began in 2006. VLCA funding provides a higher level of government subsidy to practices which agree to limit patient co-payments for general practice consultations. The original intent was to provide an alternate funding model for practices, in particular to support those serving communities with lesser ability to pay out of pocket. Subsequently this funding model was limited to practices with more than 50% "high needs" patients (most socioeconomically deprived quintile, Māori, Pacific peoples) [96].

Issues around equitable access persist however. For example, about 500,000 "high needs" patients throughout Aotearoa/NZ are not enrolled in a VLCA practice [97], and similar numbers of non-"high needs" patients are enrolled with VLCA practices. Patient age has the most significant impact on the quantum of government capitation contributions, such that any additional funding for VLCA practices is likely to be offset by the younger age profile of "high needs" population groups.

Racial/ethnic minority physicians are more likely to serve disadvantaged populations than majority physicians [98,99]. Workforce development programs have significantly increased the number of Māori and Pacific peoples in medical schools in Aotearoa/NZ and provided support and training to facilitate student success [100]. Political and legal debates over affirmative action have slowed efforts to increase the numbers of underrepresented minority physicians in the U.S. [101].

3.4.2. Integration of healthcare system with social services

Aotearoa/NZ policies more explicitly address social determinants of health than the U.S [102], although integrated medical-social services are often at the model program stage, the quality of implementation has varied, and results are mixed (Table 3). Aotearoa/NZ's greater ratio of spending on social services as opposed to healthcare leads to greater focus on social determinants of health [103]. Post-2008, Aotearoa/NZ's Whānau Ora policy has aimed to give more control to whānau (extended family) and have services designed around their needs and aspirations. This has driven integration of some health and social services and encouraged joint accountability for outcomes [104].

The Aotearoa/NZ Social Investment Agency is a cross-agency unit that focuses on value-driven investments [105]. The Agency uses integrated administrative datasets of variable quality and coverage to determine population needs and provide feedback on the fiscal implications of investing or not. The Social Investment Agency

Table 1
Aotearoa/New Zealand and United States.

Aotearoa/New Zealand and United States National Health Visions and Selected Equity Plans
I. Aotearoa/New Zealand
A. National Health Strategy and Roadmap[73] 1. Aim: a future health system in which "All New Zealanders live well, stay well, get well, in a system that is people-powered, provides services closer to home, is designed for value and high performance, and works as one team in a smart system." 2. Eight guiding principles for the system (italics added for emphasis of equity goals and cross-sector collaborations): a. *Acknowledging the special relationship between Māori and the Crown under the Treaty of Waitangi* b. The best health and wellbeing possible for *all New Zealanders* throughout their lives c. An improvement in health status of those currently *disadvantaged* d. Collaborative health promotion, rehabilitation and disease and injury prevention by *all sectors* e. Timely and *equitable access for all New Zealanders* to a comprehensive range of health and disability services, *regardless of ability to pay* f. A high-performing system in which people have confidence g. Active *partnership with people and communities* at all levels h. *Thinking beyond narrow definitions of health and collaborating with others to achieve wellbeing.*
B. The Guide to He Korowai Oranga Māori Health Strategy 2014[76] Overarching aim – Pae ora – **healthy futures** **1. 3 Elements** a. Mauri ora – healthy individuals b. Whānau ora – healthy families c. Wai ora – healthy environments
2. Directions

a. Māori aspirations and contributions
b. Government aspirations and contributions

3. Key threads
a. Rangatiratanga – control over own health and well-being
b. Building on the gains
c. Equity

4. Pathways for action
a. Development of whānau, hapu, iwi, and Māori communities
b. Māori participation in the health and disability sector
c. Effective health and disability services
d. Working across sectors

Table 1 (*Continued*)

5. Strengthening He Korowai Oranga
a. Treaty of Waitangi principles
1) Partnership
2) Participation
3) Protection
b. Quality improvement
c. Knowledge
d. Leadership
e. Planning, resourcing, and evaluation
f. Outcome/performance measures and monitoring

C. Equity of Healthcare for Māori – A Framework[75]
1. **Leadership** – championing the provision of high-quality healthcare that delivers equity of health outcomes for Māori
a. Health system – leadership sets expectation that all New Zealanders will have equity of health outcomes
b. Health organization – leadership makes organizational commitment
c. Health practitioners – healthcare focused on Māori equity

2. **Knowledge** – developing knowledge about ways to effectively deliver and monitor high-quality healthcare for Māori
a. Health system – knowledge to monitor progress in achieving equity
b. Health organization – encourage learning and sharing of high-quality health information
c. Health practitioners – strengthen capacity and capability to deliver high-quality healthcare for Māori by learning and sharing high-quality health information

3. **Commitment** – being committed to providing high-quality healthcare that meets the healthcare needs and aspirations of Māori
a. Health system – committed to reconfiguring services to meet needs of Māori
b. Health organization - committed to reconfiguring services to meet needs of Māori
c. Health practitioners – continuous quality improvement processes that focus on achieving health equity

II. United States
A. Healthy People 2020 vision statement[74]
1. Aim: "A society in which all people live long, healthy lives"
2. Mission (italics added for emphasis of equity goals and cross-sector collaborations):
a. "Identify nationwide health improvement priorities; Increase public awareness and understanding of the determinants of health, disease, and disability and the opportunities for progress
b. Provide measurable objectives and goals that are applicable at the national, state, and local levels
c. Engage *multiple sectors* to take actions to strengthen policies and improve practices that are driven by the best available evidence and knowledge
d. Identify critical research, evaluation, and data collection needs."

3. Overarching goals:
a. "Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death.
b. *Achieve health equity, eliminate disparities, and improve the health of all groups (Race/ethnicity, gender, SES, Disability, LGBT, Geography).*
d. Create *social and physical environments* that promote *good health for all.*
e. Promote quality of life, healthy development, and healthy behaviors across *all life stages.*"

B. Department of Health and Human Services (HHS) Action Plan to Reduce Racial and Ethnic Health Disparities[77]

1. Transform healthcare
   a. Reduce disparities in health insurance coverage and access to care
   b. Reduce disparities in access to primary care services and care coordination
   c. Reduce disparities in the quality of healthcare

2. Strengthen the nation's health and human services infrastructure and workforce
   a. Increase the ability of all health professions and the healthcare system to identify and address racial and ethnic health disparities
   b. Promote the use of community health workers and Promotoras
   c. Increase the diversity of the healthcare and public health workforces

Table 1 (*Continued*)

3. Advance the health, safety, and well-being of the American people
   a. Reduce disparities in population health by increasing the availability and effectiveness of community-based programs and policies
   b. Conduct and evaluate pilot tests of health disparity impact assessments of selected proposed national policies and programs

4. Advance scientific knowledge and innovation
   a. Increase the availability and quality of data collected and reported on racial and ethnic minority populations
   b. Conduct and support research to inform disparities reduction initiatives

5. Increase efficiency, transparency, and accountability of HHS programs

C. Centers for Medicare and Medicaid Services (CMS) Equity Plan for Improving Quality in Medicare[78]

1. Expand the collection, reporting, and analysis of standardized data

2. Evaluate disparities impacts and integrate equity solutions across CMS programs

3. Develop and disseminate promising approaches to reduce health disparities
   a. Building an organizational response to health disparities – Resource Guide
   b. Solutions for health plans
      1) Medicare Advantage stratified performance measures by race/ethnicity
   c. Solutions for hospitals
      1) Guide to preventing readmissions among racially and ethnically diverse Medicare beneficiaries
   d. Developing solutions for providing Culturally and Linguistically Appropriate Services (CLAS)[179]

4. Increase the ability of the healthcare workforce to meet the needs of vulnerable populations
   a. Identifying promising practices – e.g. community health workers, multidisciplinary teams
   b. Training for providers – e.g. collecting sexual orientation/gender identity data

5. Improve communication and language access for individuals with limited English proficiency and persons with disabilities

6. Increase physical accessibility of healthcare facilities

has been very controversial. Supporters suggest that predictive risk modelling could streamline helpful services to individuals. Critics note the high risks of reinforcing cognitive and structural biases [106], and that formulae emphasize cost-savings rather than societal benefits [107]. Subsequent policies could be viewed as punitive, potentially harmful, and stigmatizing to individuals. Analyses are limited by the available data and thus might not target services to the groups who need them most [107]. Privacy is invaded and it might be dangerous for the state to have these detailed data.

Commentators highlight that if the goal is to improve health reform programs [111]. Some grantees have integrated medical and social services such as Minnesota's Accountable Communities for Health [112].

Overall, both countries struggle with collaboration across sectors including health, housing, education, employment, urban planning, and public safety. Challenges include creating shared governance and funding streams across sectors, and developing, implementing, and rewarding joint accountability metrics for the common good of the population.

Both countries also struggle to address the inequitably distributed public health impacts of harmful commodities (e.g.,

equity and avoid negative unintended consequences, effective tools and analytical techniques must be embedded within a culture that truly prioritizes improving individuals' well-being ahead of cutting public spending. Potential safeguards for predictive analytics include developing a code of ethics, making transparent the data analysis process and use of results, assessing impact on equity, and analyzing not only individuals but also neighborhoods to examine which areas need more resources [106].

In the U.S., early model accountable care organizations (ACOs) that cover more than 10% of the population create implicit incentives to address social determinants to keep people healthy and prevent costly health expenditures [108,109]. These incentives are most explicitly designed in the Center for Medicare and Medicaid Innovation (CMMI) Accountable Health Communities initiative which requires screening for health-related social needs and linkage of persons to community resources that can address those needs, and creates funding streams to support integrated, cross-sector efforts [110].In the CMS State Innovation Model, states implement multipayer healthcare payment and delivery system

tobacco, alcohol, problem gambling, firearms) that have significant corporate influences [113]. For instance, the tobacco industry has targeted and tailored their advertising and outreach to the African-American community [114]. Anti-smoking strategies have lowered smoking rates in both countries, but ethnic inequities remain [115,116]. The focus on individual behavior change rather than population-level approaches reducing supply and demand (e.g., increasing price and taxes; reducing access, advertising, and sale of products) appears to have worsened inequities. Disappointingly, despite strong population-based recommendations in the Aotearoa/NZ Law Commission's report on reducing alcohol-related harm, few have been implemented [117], and the U.S. has made little progress enacting sensible gun control regulation or funding gun violence research [118].

3.4.3. *Structure and quality of care, and payment*

The U.S. has small independent physician and group practices as well as larger managed care plans and integrated delivery systems. Health inequities by race/ethnicity and socioeconomic status

Table 2
National Health Policies Addressing Access to Care [179–182].

A. General policies

Aotearoa/New Zealand	United States
Public system: 80% of total health expenditures[86] All citizens and permanent residents can access publicly funded health and disability services for preventive, inpatient and outpatient hospital services, primary care, prescription drugs in national formulary, mental healthcare, dental care for schoolchildren, home support services and long-term residential care for older adults, hospice, and disability support Out-of-pocket payment Co-payments for general practitioners (GPs) and nursing services in GP clinics Co-payments for first 20 prescriptions per family per year ($NZ5.00 per item) Primary care 13 years and under – free Others – 98% are subsidized in Primary Health Organisations (PHO) National requirements for publicly funded services for the 20 District Health Boards (DHBs) Annual budget and benefit package determined by political priorities and health needs Rationing and prioritization for nonurgent services	Public insurance – Approximately 50% of total health expenditures;[181] 37% of residents[80] Medicare (65 yrs and older; end-stage renal disease) – 16% Medicaid (poor, disabled) – 20% Direct purchase - 16% Military – 4.7%
Privately funded – 20% of total health expenditures Out-of-pocket payment – 12.6% of total health expenditures[79] Private insurance Levies for no-fault injury compensation scheme	Privately funded – Approximately 50% of total health expenditures
Private insurance – 35% of all adults, fewer Māori and Pacific adults (adjusted rate ratios 0.5 and 0.6, respectively); 28% of all children age 0-14 years, fewer Māori and Pacific children (adjusted rate ratios 0.4 and 0.5, respectively)[180] 5% of total health expenditures Cost-sharing Elective surgery in private hospitals Private outpatient specialist consultations Faster access to nonurgent treatment	Private voluntary health insurance, mostly employer-based – 67% of residents 2016 – 8.6% uninsured
No fault Accident Compensation Corporation Universal coverage for accidental injuries including treatment costs and 80% of pre-injury	2010 Affordable Care Act[182] Medicaid expansion determined by states (33 states and District of Columbia have expanded) - 90% subsidy by federal government Insurance exchanges for those not qualifying for Medicaid– subsidized premiums Individual mandate – requirement to buy health insurance (repealed in 2017) 10 essential health benefits coverage required (e.g. ambulatory / outpatient services; emergency services; hospitalization; pregnancy, maternity, and newborn care; mental health and substance use disorder services, prescription drugs; rehabilitative and habilitative services and devices; laboratory services; preventive and wellness services and chronic disease management; pediatric services, including oral and vision care.)
	Insurance variables Co-payments Deductibles High-deductible health plans; health savings accounts Tiered drug prescription formularies Differential pricing of generic and brand-name drugs Value-based insurance design Better coverage of more effective treatments Federal and state workmen's compensation laws Tort system for injuries

earnings	
B. Equity-specific policies	
Aotearoa/New Zealand	**United States**
Patient co-payments capped ($NZ17.50) in low-income areas (1/3 Aotearoa/NZ)	Federally-qualified health centers Public hospitals Local health departments Free clinics Disproportionate share hospital payments for uncompensated care Charity care – private providers

are seen across different practice arrangements [119,120], involving tensions between cost control and quality of care, and access to care (such as which providers are covered by managed care plans and preferred provider networks that selectively contract with providers). Both for-profit and non-profit, and public and private providers and hospitals exist, with organizational characteristics associated with inequities and cultural competence [121,122]. A perenially underfunded Indian Health Service provides care to 2.2 million AIAN [123]. Many Aotearoa/NZ physicians divide their work between public and private systems, exacerbating inequities if they favor private patients [57]. Compared to commercially owned primary care clinics, community-governed practices in Aotearoa/NZ care for more patients from lower socioeconomic groups and charge lower fees [124].

Value-based purchasing systems that reward quality of care are increasing in both countries (Tables 4 and 5). In the United States, federal value-based purchasing programs cover inpatient, physician, managed healthcare plan, and end-stage renal disease care. By 2018, the U.S. Medicare program aims to have 90% of its fee-for-service payments tied to value in the Merit-Based Incentive

Table 3
National Health Policies Addressing Integration of Healthcare System with Social Services.

A. General policies	
Aotearoa/New Zealand	**United States**
Programs integrating health and social services 2017- Social Investment Agency – data analytics, risk stratification of population, targeted interventions to reduce costs and improve outcomes	Accountable Care Organizations (ACOs), global budgets, capitation, bundled payment, shared savings plans – indirect incentives for integration and coordination
B. Equity-specific policies	
Aotearoa/New Zealand	**United States**
2000s – Multisector policy – housing, education, health District Health Boards (DHBs) and Primary Health Organisations (PHOs) required to develop strategies to reduce disparities	Accountable Health Communities – link persons with health-related social needs to community resources along with funding stream
PHOs created specifically for Māori or Pacific populations	State Innovation Model (SIM) – some states such as Minnesota integrate medical and social services
Post-2008 – specific policies	
Whānau Ora – integrate health and social services Develop coordinated, multiagency approaches to service provision and foster joint responsibility for outcomes	Integration of medical and social services for older Medicaid beneficiaries who need long-term care
Cross-sector trials for teenagers - truancy, crime; alcohol and drug abuse; education, training, or employment	

Payment System [125]. However, payments to physicians will only be adjusted +/– 4% in 2019 increasing to +/– 9% in 2022 [126]. In Aotearoa/NZ, 3% of primary care payments are subject to pay-for-performance [79]. Incentivizing improvement in quality of care and outcomes for the aggregate patient population theoretically provides an indirect incentive to improve care of patient groups that are doing poorly. In practice, however, inequities in both countries have largely persisted, suggesting that generic "rising tide lifts all boats" policies for improving quality of care are flawed for achieving equity [127].

Aotearoa/NZ is recognised internationally for its quality of ethnicity data in health data-sets, critical for measuring and reporting inequities in quality of care across ethnic groups. Indigenous health leaders have advocated for high quality ethnicity data over many years, ensuring visibility for all ethnic minority groups. However,

social risk factors [132]. In Medicare's Value-Based Purchasing Programs, crude social risk factor data such as whether a patient has Medicaid insurance is applied to specific programs [133], but not through a systematically developed approach such as the NZDep which is sensitive to small area variation in socioeconomic deprivation [94].

The National Academy of Medicine, U.S Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation, and National Quality Forum (NQF) all recommend social risk factor adjustment for payment and/or public reporting of performance measures under specific circumstances [133–135]. They note that incorporation of an equity lens into quality improvement and payment efforts is a potentially high-yield opportunity [136].

The governmental Pharmaceutical Management Agency of New

both countries are at early stages of publicly reporting standardized national clinical performance data stratified by race/ethnicity and socioeconomic deprivation [128,129]. The DHB Māori Health Profiles present key health indicators for Māori compared with non-Māori. Summary profiles are provided in te reo Māori (the Māori language). Both Aotearoa/NZ's Health Quality and Safety Commission's Equity Explorer and the Trendly database (www.trendly.co.nz) provide limited data on performance indicators for Māori, though of the two, Trendly is the most up to date [130]. Aotearoa/NZ does not routinely publicly report national performance measures which are reflective of public and government priorities (e.g. National Health Targets), by ethnicity or deprivation – but instead uses the total population indicator [131]. The United States Agency for Healthcare Research and Quality National Healthcare Quality and Disparity Reports note persistent disparities in processes of care and outcomes across race/ethnicity and socioeconomic status [127].

Both countries lack high quality data on Asian, Pacific peoples, and other ethnic subgroups. Also, frequently aggregating these subgroups or combining them with "Other" ethnicities, has led to invisibility and lack of prioritizing health needs of these groups. Important distinctions are lost such as countries of origin, whether native-born or not, and refugee status.

Neither country explicitly rewards reduction of healthcare inequities. Until a recent trial period, the U.S. Medicare program forbade adjustment of clinical performance measures for

Zealand creates an evidence-based national drug formulary using cost-effectiveness analyses, and lowers drug prices by negotiating with pharmaceutical companies [137]. The U.S. Veterans Administration that cares for former military personnel negotiates drug prices with pharmaceutical companies, but the U.S. Centers for Medicare and Medicaid Services are forbidden from doing this negotiation [138]. Thus, medication prices are lower in Aotearoa/NZ than the U.S., and the high costs of medications contribute to health inequities in the U.S.

In Aotearoa/NZ cultural competence, embedded in legislation under the Health Practitioners Competence Assurance Act [139], is incorporated in health professional education and training programs. However, the extent to which trainees and graduates are required to demonstrate competence in Māori health and health equity is limited. In the U.S., cultural competency training at the Undergraduate Medical Education and Graduate Medical Education levels has been voluntary although expanding [140].

3.5. *Equity roadmaps and promising demonstration programs*

Supplemental Table 1 summarizes the key evidence-based processes and practices from the Robert Wood Johnson Foundation Finding Answers Program (www.solvingdisparities.org) and National Academy of Medicine [27,141]. Key principles include commitment to achieving equity, implementing a data-driven quality improvement process with root cause analysis that

Table 4
National Health Policies Addressing Structure and Quality of Care.

A. General policies

Aotearoa/New Zealand	United States
Structure of care: 20 District Health Boards (DHBs) Plan health services and seek to achieve government objectives Operate government-owned hospitals and health centers Provide community services Purchase services from nongovernment and private providers Primary Health Organisations (PHO) – self-employed providers Most general practitioners (GPs) belong to organized networks Many specialists work independently in multispecialty clinics District-level alliances (DHBs, PHOs and others such as pharmacy, ambulance, district nursing, allied health, local government, Māori providers) to drive stronger system integration by changing service models.	Structure of care: Small independent physician and group practices Managed care plans and integrated delivery systems Capitation Preferred provider networks – selective contracting of providers with health plans Which providers are available in Medicaid plans and low-cost plans Population health management For-profit, non-profit, public
Public reporting of performance data: Health Quality and Safety Commission – Atlas of Healthcare Variation District Health Boards Six health targets Waiting times Access to primary care Mental health outcomes Primary Health Organisations Screening rates for chronic disease Annual Quality Accounts by DHBs since 2012 Public hospitals Patient experience surveys	Public reporting of clinical performance data in Medicare program: Hospital Compare Physician Compare Nursing Home Compare Home Health Compare

B. Equity-specific policies

Aotearoa/New Zealand	United States
The New Zealand Public Health and Disability Act 2000, section 22(1)(e) and (f) states that DHBs must work to reduce health disparities by improving health outcomes for Māori and other population groups. Stratified data public reporting at early stages – Māori,	Centers for Medicare and Medicaid Services (CMS) Equity Plan for Improving Quality in Medicare (see Table 1) Department of Health and Human Services (HHS) Action Plan to Reduce Racial and Ethnic Health Disparities (see Table 1)

Pacific peoples, NZ European and Asian	
Workforce development – Māori, Pacific peoples affirmative action for medical schools	Stratified data public reporting at early stages at CMS – aggregate national statistics
Medical Council of New Zealand cultural competency training requirements and indigenous standards	Workforce development – No affirmative action for medical schools
Very Low Cost Access (VLCA) practice Māori and non-governmental organization (NGO) versions could have community health workers / patient navigators, well-child programs, longterm condition programs, colocated services, function as team, mobile stations	Undergraduate Medical Education and Graduate Medical Education cultural competency training largely voluntary
Māori health programs	Indian Health Service: Hospitals, clinics, health stations Underfunded Facilities managed by Indian Health Service, tribes, urban health stations
Equity research funding e.g. causes of inequities and solutions	Equity research funding – e.g. National Institute on Minority Health and Health Disparities and specific health disparity program announcements and requests for applications from other National Institutes of Health (NIH) institutes

addresses the patients' specific needs in context, and forming partnerships with families and communities. Team-based approaches incorporating community health workers have been effective. Successful programs tackle issues at multiple levels, such as the patient, clinician, organization, community, and policy, and address medical and social determinants of health. Sustainability requires institutionalization and healthcare payment policies that explicitly support equity. Promising demonstration programs have followed these principles for success.

3.5.1. *Aotearoa/NZ childhood immunization*

Between 2007 and 2012, the Aotearoa/NZ Ministry of Health set immunization targets for two-year old children, starting at 80% for July 2009 and increasing to 95% by July 2012 [142,143]. In 2007, immunization rates were 74% for non-Māori-non-Pacific children and 59% for Māori. By June 2012, the gaps had largely disappeared; rates for NZ European children were 93% vs. 92% for Māori [142]. Accountability was critical. The Minister of Health set the expectation with a directive that the target be achieved for all population groups including Māori, Pacific peoples, and those living in the most deprived households. The Ministry of Health then published quarterly public reports of immunization rates ranking DHBs. This new system established accountability from the nation to DHBs to primary health organizations to primary care providers and local champions.

Table 5
National Health Policies Addressing Payment.

A. General policies **Aotearoa/New Zealand**	**United States**
Primary care General practitioners (GP) ½ income government subsidy paid through Primary Health Organisations (PHOs) + patient copayments Pay-for-performance PHOs – additional per-capita funding to improve access Multidisciplinary care teams Pay-for-performance – 3% additional – cancer, diabetes, cardiovascular disease screening and follow-up, vaccinations. Outpatient specialists Salary – District Health Board (DHB), public hospital Private practice and private hospital – Fee-for-service; set own fees	Gradual transition from fee-for-service to value-based purchasing Fee-for-service: pay for volume Value-based purchasing: pay for quality Aiming for 90% of Medicare payment by 2018 Medicare Access and Children's Health Insurance Program (CHIP) Reauthorization Act (MACRA) Merit-based Payment Incentive System (MIPS) – Fee-for-service payment linked to clinical performance incentives – 90% of FFS payments by 2018 Advanced Alternative Payment Models (APMs) – 50% of Medicare payments by 2018 – e.g. global and capitated payments, patient-centered medical homes (PCMH), accountable care organizations (ACO)
Mental healthcare – mostly public	Mental healthcare – private and public
Home support services for older adults– DHBs	Long-term care – Medicaid, private insurance, self-pay
Residential care for older adults – means-tested public subsidy, self-pay	
	Pay-for-performance in Medicare program Hospital Readmissions Reduction Hospital-acquired Conditions Reduction Hospital Value-based Purchasing Medicare Advantage Star Rating Medicare Shared Savings Physician Value-based Payment Modifier End-stage Renal Disease Quality Incentive Skilled Nursing Facilities Home Health Agencies
Medications Pharmaceutical Management Agency of New	Medications United States Veterans Administration negotiates

Zealand (PHARMAC) creates evidence-based national drug formulary with criteria including cost-effectiveness analyses. PHARMAC lowers drug prices by negotiating with pharmaceutical companies.	drug prices with pharmaceutical companies Medicare and Medicaid programs are forbidden from negotiating with pharmaceutical companies
B. Equity-specific policies	
Aotearoa/New Zealand	**United States**
National Population-based Funding Formula for health services to DHBs adjusted by New Zealand Index of Deprivation, ethnicity (Māori, Pacific Islander, Other), sex, and age	Selected case-mix adjustment in some funding
	Inconsistent use of some social risk factor data in some of Medicare's Value-Based Purchasing Programs
Very Low Cost Access (VLCA) funding for practices with 50% or more of patients registered as high need based on bottom quartile social deprivation, Māori, Pacific peoples	Increase payment for dual-eligible (patients with Medicare and Medicaid insurance) in Medicare Advantage Program
	Disproportionate Share Hospital Payments for uncompensated care
	Social risk factor adjustment trial period in performance measure reporting for Medicare and Medicaid

Collaborative and competitive improvement techniques were incorporated [142]. Immunization networks comprised of DHBs within regions shared best practices as did immunization advisory groups within DHBs. Public rankings created comparative competition. Other contributors to success were teamwork, improved communication and coordination of activities across partners, and passion. Systems processes included funding for immunization, outreach to families with better follow-up, immunization with community based organizations, data systems for tracking and monitoring, pay for performance, and lay advocates [142].

3.5.2. Māori Sudden Unexpected Death in Infancy (SUDI) Prevention

Sudden unexpected death in infancy (SUDI) is the leading cause of preventable death for babies in Aotearoa/NZ. Though Aotearoa/NZ has made progress in significantly reducing rates of SUDI over the last two decades with universal safe sleep messaging that focused on downstream risk factors, such interventions were far less effective for Māori [144]. Currently, though still higher in Māori compared with non-Māori, rates are improving for Māori babies secondary to culturally tailored interventions developed by indigenous leaders [144]. Māori women have higher rates of maternal smoking and bed sharing with their babies than NZ European women, both associated with higher rates of SUDI. A randomized trial of the wahakura (traditional flax woven basket) versus the gold standard bassinet found that the subsequent rates of infant risk behaviors in each group were similar, supporting comparable effectiveness of each sleeping device in preventing SUDI [145], and there were additional advantages with the wahakura such as sustained breast feeding. Some Māori women may be more likely to effectively use the wahakura than the standard bassinet, especially when embedded within a cultural tailored intervention. In the Te Aka Oranga Waikawa Wahakura Wananga program [144], master flax weavers create wahakura and teach mothers about safe sleeping practices, decreased smoking, and breastfeeding. Mothers in that program reported holistic spiritual educational experiences, more engagement, and increased use of wahakura [144]. Aotearoa/NZ is now developing a national SUDI prevention program with universal and culturally tailored approaches.

3.5.3. Nuka system of care for Alaska native people in Anchorage, Alaska

The Nuka System of Care is a holistic, population-based healthcare system owned, created, and implemented by Alaska Native people to maximize physical, mental, emotional, and spiritual well-being [146]. Alaska Native people took control of their healthcare system from the federal Indian Health Service and became customer-owners who tailored the system to meet their needs through a self-determined process. Key principles were shared responsibility, commitment to quality and continuous improve-

4. Discussion

Analysis of Aotearoa/NZ and U.S. approaches to advance health equity yield important lessons. Nations must authentically commit to achieving health equity. For Aotearoa/NZ and the U.S., a chasm exists between national aspirational goals for health equity and persistent health inequities in quality of care and outcomes. Inequities across race/ethnicity and socioeconomic status after decades of Māori health, ethnic minority health, and care of socioeconomically deprived groups being declared "priorities" is evidence that, despite the rhetoric, our societies are disturbingly tolerant of these inequitable health outcomes [150].

4.1. Lessons for Aotearoa/New Zealand and the United States

Several key actions could significantly advance equity:

1. Explicitly design quality of care and payment policies to achieve equity, holding the healthcare system accountable through public monitoring and evaluation, and supporting with adequate resources [151]. National equity statements are ineffective if implementation practices are not specifically geared to achieve equity. National quality improvement and payment efforts have not been designed with explicit goals of supporting and incentivizing health equity [152]. Existing programs are not supported by accountability mechanisms based on outcomes and achievement of health equity. Payment policies must align with health equity to enable sustainable equity interventions to occur and to help motivate constructive action by healthcare organizations, clinicians, and administrators [9]. Also, both countries have focused their health payment

ment, and family wellness. Care is mostly prepaid, in Anchorage and rural areas with outreach, using a tailored patient-centered medical home. Relationships are critical, with patients and across the organization. The system has improved access to care and quality of care; reduced emergency department visits, specialty visits, and hospital days; reduced staff turnover; and had high patient satisfaction [146]. The Nuka System of Care demonstrates that health inequities are not inevitable when self-determination is enabled. In contrast, Māori providers face a variety of institutional challenges around self-determination and autonomy, rigid non-Māori world views of health care systems, funding, and power that have made creation of a system analogous to Nuka unachievable to date in Aotearoa/NZ [147].

3.5.4. Minnesota's hennepin health safety-net accountable care organization

Hennepin Health is an ACO that cares for 8700 high-risk, low-income patients in Minnesota's Medicaid program [148]. Approximately 70% come from racial/ethnic minority groups, and of those who sought care in the first 18 months of the program 60% had a major psychiatric diagnosis [149]. Sixty-five percent report lack of social support, 43% housing needs, and 24% alcohol or drug use concerns [149]. Four county health organizations partner with the Minnesota Department of Human Services to provide medical and social services for these patients. The Medicaid program pays the ACO a per-member per-month fee, and any savings or losses are shared by the partners. An integrated electronic medical record and data warehouse risk stratify patients to identify those most likely to benefit from intensive case management. Community health workers and a care coordination team facilitate health and social services. Early results show an increase in outpatient visits, decrease in emergency department visits and hospitalizations, increased quality of care, and high patient satisfaction with their experiences [148]. The global capitated budget allows the ACO to invest upfront in community health workers, care coordination team, and data infrastructure.

systems, budgeting, and attention mostly on acute hospital and specialty care rather than preventive and primary care services that are critical for prevention, early diagnosis and treatment to reduce complications, morbidity, and health inequities [153].

In 2017, the multistakeholder NQF published *A Roadmap for Promoting Health Equity and Eliminating Disparities: The Four I's for Health Equity* that recommended to the U.S. Centers for Medicare and Medicaid Services and private payers what policies to enact and actions to implement to systematically advance equity (Supplemental Table 2) [135]. These approaches must include adequate public funding or subsidization of services for those who cannot afford to bypass queues for urgent services and cost-effective primary care by buying access into the private healthcare market. Workforce policies should build capacity to meet the needs of indigenous peoples, racial/ethnic minority populations, and communities that experience socioeconomic deprivation [99,154].

2. Address all determinants of health for individuals and communities with coordinated approaches, integrated funding streams, and shared accountability metrics across health and social sectors. Aotearoa/NZ and the U.S. recognize social determinants of health as key drivers of health inequities [155,156], but successful programs integrating health and social services are mostly at the demonstration stage.

3. Share power authentically with racial/ethnic minorities and promote indigenous peoples' leadership and self-determination. The Nuka system of care for Alaska Natives shows the power of self-determination, community participation, and indigenous knowledge and leadership. Interventions in healthcare systems and organizations that serve smaller percentages of racial/ethnic minority patients also benefit greatly from collaborative partnerships with these communities. A key principle of quality improvement is that the customer must be the focus [157]. Partnering with patients and communities in meaningful, participatory ways where power is shared, is critical for understanding root causes of inequities and successfully designing and implementing solutions, in contrast to imposing top-down programs likely to be flawed even when created with the best intentions. However, empowering racial/ethnic communities does not mean that the state abrogates its responsibilities in achieving health equity. For example, laws and regulations around alcohol and tobacco, healthy foods, and gun violence will require government action to counteract strong industry financial interests.

4. Have free, frank, and fearless discussions about structural racism, colonialism, white privilege [158], *and implicit biases, ensuring that policies and programs explicitly address root causes.* Intrinsic motivation and professionalism are important drivers of health equity efforts [151]. However, discussions about racism and colonialism remain difficult, and are all too often avoided [159]. Robin DiAngelo, PhD, coined the term "white fragility" to describe a state in which racial stress can lead to defensive emotions and behaviors in whites such as anger, fear, guilt, argument, silence, or withdrawal [160]. It is critical to develop psychological and emotional awareness and strength in whites to enable them to push past these barriers and engage in meaningful discussions of root causes of inequities. Discomfort cannot be a reason to avoid dialogue, for then "white fragility" would in essence be a tool to perpetuate inequities in the power structure [161].

In a 1993 documentary about the Treaty of Waitangi, then Aotearoa/NZ Prime Minister Jim Bolger stated: "How do we make this founding document work for New Zealand. . ..it really has to work for both of us [Māori and non-Māori]. . ..Not to have it as something that forces us to look back, but really forces us to look forward [162]." This statement can be viewed as constructively

marketplaces, and federal funding streams (for example, accountable care organizations, shared savings plans) help nurture and incentivize innovation [170]. The Affordable Care Act includes a provision by which any of CMMI's demonstration programs that improves quality without raising costs or reduces costs without reducing quality can be enacted automatically into the core Medicare and/or Medicaid programs without approval by Congress [171]. In addition, robust quality improvement and academic research and evaluation efforts study and disseminate the results of demonstrations. In Aotearoa/NZ there is the opportunity to foster innovative models that drive health equity through national and local government forming truly collaborative partnerships with Māori, Pacific peoples and other communities, where power is shared equitably. Supported by philanthropy, social enterprise and not-for-profit organizations, corporations, non-governmental organizations and academia, such partnerships could potentially nurture, incentivize, and evaluate pro-equity demonstration programs that lead to equitable outcomes.

4.3. Additional lessons for the United States

The U.S. should question whether it has its national cultural values appropriately balanced. From a Western American ethical lens, the U.S. overweights liberalism's principles of individualism and

seeking to look ahead, or conversely devaluing the historical lived experience of the Māori or avoiding a difficult discussion about the oppression and systematic disadvantage resulting from colonialism, racism, and white privilege. The dissolution of Te Kete Hauora, Māori Health Business Unit at the Ministry of Health in 2016, which provided policy advice and equity analyses for the Government's objective to achieve health equity for Māori, is concerning [131]. This department ensured that issues of racial/ethnic minorities remained a priority and spearheaded integration of equity across the whole Ministry. The U.S similarly has a difficult time discussing race, class, and social inequities, worsened recently with divisive rhetoric by elected national leaders [24]. Implementing recommendation 1 to have a strong, explicit equity lens in quality of care and payment policies requires honest discussions about the drivers and nature of health inequities [163], and a commitment to dismantling systems of racism and colonialism.

4.2. Additional lessons for Aotearoa/New Zealand

New Zealanders might ask themselves if they have the most appropriate free market signals and support from the state to encourage, develop, evaluate, and disseminate successful models for innovation, equity, and efficiency [164]. Both countries struggle with structural issues such as underfunding of primary care compared with hospital care [165], and the U.S. healthcare system has inefficiencies such as the fee-for-service payment system that incentivizes volume rather than quality of care [166]. However, given its sheer size and diverse contexts, the U.S. has many interesting emerging models of care and payment across the 50 states including value-based purchasing, value-based insurance design [167], accountable care organizations [109], and bundled payments [168] that have spurred innovative interventions. These models and settings vary in the extent they emphasize collaborative and competitive market-based principles. Good and bad examples exist of each model, and key is finding the right mix and design of interventions for specific patient, population, organizational, and market contexts to achieve health equity [169].

A combination of seed money from private foundations, demonstration project funding such as that from the CMMI, competitive

freedom from the state out of proportion to principles of communitarianism and distributive justice. Or, as the American historian David Hackett Fischer argues, New Zealanders prioritize fairness while Americans value freedom [172]. This statement is very much an over-simplification, as Aotearoa/NZ exhibits considerable tensions between neoliberal viewpoints and support for the social welfare state [15,173], and some citizens care about egalitarianism, poverty, and homelessness until they have to pay higher taxes [174]. However, Aotearoa/NZ does have a higher floor for its safety net than the U.S. [85]. The Māori concept of whānau values the family and community [104]. Scholars and thought leaders ranging from Robert Putnam to David Brooks lament the loss of community in America [175,176]. Thus, America still allows 28 million people to be uninsured [177], and much of the debate around health reform focuses on individual rights and liberties rather than health outcomes for people [178].

5. Conclusions

Intrinsic and extrinsic motivation need to be optimized to achieve health equity [151]. Nations need to truly value and prioritize equitable health outcomes to create the policies, incentives, and governing structures that will allow best practices to occur, and to close the gap between high-level policy intent and equitable health outcomes in the population. Success will require free, frank, and fearless discussions about the causes of inequities and a society's underlying values, measurement and monitoring of inequities, root cause analysis of these inequities, tailored interventions addressing community needs, and cross-sectoral collaboration and integrated funding to address underlying social determinants of health.

Our paper is limited by our perspectives, although we purposely assembled an eclectic study team and set of internal reviewers. Nonetheless, both Aotearoa/NZ and the United States have significant room for improvement in health equity compared to many Western nations, and fail on the Commonwealth Fund's report card for equity [38]. Neglecting to address these inequities with approaches known to be effective is a tremendous waste of human potential and societal productivity.

Conflict of interest statement

Declarations of Interest: Dr. Chin co-chairs the National Quality Forum Disparities Standing Committee. He is also a consultant to the Patient-Centered Outcomes Research Institute (PCORI) disparities portfolio and co-directs the Merck Foundation Bridging the Gap: Reducing Disparities in Diabetes Care National Program Office.

Prior Presentations: This paper was presented in part at the National Institutes of Health (NIH) conference "Type 2 Diabetes and Obesity Disparities: Enhancing Lifestyle and Self-Management," October 24, 2017, Bethesda, Maryland, and the Patient-Centered Outcomes Research Institute (PCORI) Health Care Systems and Disparities Research Seminar, November 8, 2017, Washington, D.C.

We would like to thank the feedback of our colleagues from Aotearoa/New Zealand and the United States on a prior version of this paper.

Acknowledgments

Funding: Dr. Chin was a William Evans Visiting Fellow in the Department of Preventive and Social Medicine at the University of Otago, Dunedin. For this paper, he was partially supported by the

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Chicago Center for Diabetes Translation Research [grant number NIDDK P30 DK092949] and the Robert Wood Johnson Foundation Finding Answers: Solving Disparities Through Payment and Delivery System Reform Program Office. The sponsors had no role in study design, the collection, analysis and interpretation of data; in the writing of the article; and in the decision to submit it for publication.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.healthpol.2018.05.001.

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Health Affairs

At the Intersection of Health, Health Care and Policy

Cite this article as:
Rachel H. DeMeester, Lucy J. Xu, Robert S. Nocon, Scott C. Cook, Andrea M. Ducas and Marshall H. Chin
Solving Disparities Through Payment And Delivery System Reform: A Program To Achieve Health Equity
Health Affairs 36, no.6 (2017):1133-1139
doi: 10.1377/hlthaff.2016.0979

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By Rachel H. DeMeester, Lucy J. Xu, Robert S. Nocon, Scott C. Cook, Andrea M. Ducas, and Marshall H. Chin

Solving Disparities Through Payment And Delivery System Reform: A Program To Achieve Health Equity

ABSTRACT **Payment systems generally do not directly encourage or support the reduction of health disparities. In 2013 the Finding Answers: Solving Disparities through Payment and Delivery System Reform program of the Robert Wood Johnson Foundation sought to understand how alternative payment models might intentionally incorporate a disparities-reduction component to promote health equity. A qualitative analysis of forty proposals to the program revealed that applicants generally did not link payment reform tightly to disparities reduction. Most proposed general pay-for-performance, global payment, or shared savings plans, combined with multicomponent system interventions. None of the applicants proposed making any financial payments contingent on having successfully reduced disparities. Most applicants did not address how they would optimize providers' intrinsic and extrinsic motivation to reduce disparities. A better understanding of how payment and care delivery models might be designed and implemented to reduce health disparities is essential.**

Health care disparities persist despite decades of research documenting them,[1] determining underlying root causes,[2] and testing solutions.[3] Differences in the quality of care and health outcomes across dimensions such as patients' race, ethnicity, and socioeconomic status cause much human suffering at great economic cost.[2] Multiple factors cause disparities in health outcomes, including unconscious bias and cultural insensitivity by clinicians and health care organizations; differential health care; and structural inequities in the social, economic, and physical environments in which people live.[2]

The good news is that research and demonstration programs, such as the Finding Answers: Disparities Research for Change program of the Robert Wood Johnson Foundation (RWJF),[4,5] have elucidated what types of interventions can reduce disparities.[6–8] For example, multicomponent interventions that address the drivers of disparities are promising, as are culturally tailored interventions; team-based care; community health workers and patient navigators; involving families and community partners in solutions; and interactive, skills-based training for patients.[7] Equitable care does not mean the same care for different patients, because it is necessary to individualize care to the particular needs and challenges of specific patients to optimize their health outcomes. These interventions need to be embedded in a road map or systematic process in which health care organizations and providers make achieving health equity a high priority and tailor solutions for their settings and populations.[7–9]

Too often, though, reducing health disparities has not been a priority for front-line health care organizations. Health care systems and providers have been consumed by immediate concerns such as implementing an electronic health record system, meeting meaningful-use requirements, and grappling with the demands of value-based purchasing and the shift from fee-for-service payment to global and bundled payment. As payments are cut and profit margins shrink, health care organizations increasingly concentrate on their perceived core business. As a result, efforts less immediately related to their bottom line, such as work to reduce disparities, become less salient to them. Many organizations lack the time and resources to address disparities seriously.[7,10]

However, major national organizations are increasingly recognizing that payment systems may be an important mechanism for reducing health dispar-

DOI: 10.1377/hlthaff.2016.0979: HEALTH AFFAIRS 36 NO. 6 (2017): 1133–1139

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ities.[10] Surprisingly, the 2015 *CMS Equity Plan for Improving Quality in Medicare* did not explicitly mention payment systems as a lever to reduce disparities.[11] But in 2016 the Office of Minority Health of the Centers for Medicare and Medicaid Services (CMS) charged the National Quality Forum's Disparities Standing Committee with developing a conceptual model and recommendations for reducing disparities that included payment reform recommendations (Helen Burstin, National Quality Forum, personal communication, October 19, 2016). Creating the business case for achieving health equity was featured in the September 2016 Health Equity Forum sponsored by the American Hospital Association and the Joint Commission,[10,12] and in a 2016 Families USA conference.[13] In December 2016 the Office of the Assistant Secretary of Planning and Evaluation in the Department of Health and Human Services recommended developing health equity measures and adjusting payment to reward achievement or improvement of outcomes in Medicare beneficiaries with social risk factors, such as low income, race, and ethnicity.[14]

Care transformations can reduce disparities,[7,8] and simultaneously many providers, payers, and policy makers have been experimenting with payment reform as they attempt to lower costs and improve quality. For example, enhanced per member per month payment in some patient-centered medical home models and increased flexibility in how funds are used under new shared savings plans can provide more compensated time for care coordinators who are especially helpful for sicker and more vulnerable patients.[15,16] Data that power the changes being made by accountable care organizations (ACOs) can illuminate disparities and target interventions.

However, few researchers have examined payment reform as a tool to achieve equity. Systematic reviews of pay-for-performance initiatives indicate that few have been explicitly designed to reduce disparities, and general pay-for-performance incentives have usually not affected disparities.[17] The Massachusetts Medicaid program launched a limited experiment to create financial incentives to reduce disparities, but it was unsuccessful because of limited racial diversity of patients in many hospitals, measurement and statistical challenges, and the lack of an interactive quality improvement approach.[18]

In 2013 the Finding Answers: Solving Disparities through Payment and Delivery System Reform program began a focused exploration of ways to achieve equity by transforming the way care is paid for and delivered. At the initiative's core is a grants program to study organizations that attempt to use innovative payment and delivery system reform to reduce disparities. Historically, the RWJF has received many applications to calls for proposals focusing on care delivery interventions to reduce disparities.[4] But this newer Finding Answers program's additional requirement to use payment reform to reduce disparities is novel. This article describes our vision for the program and the strengths and weaknesses of applicants' proposals, thus providing a window into the current state of the field. We also make recommendations for future research and exploration.

Study Data And Methods

PROGRAM GOALS The RWJF's Finding Answers: Solving Disparities through Payment and Delivery System Reform program aims to inform health care organizations, providers, payers, and policy makers about how to achieve equity by implementing delivery system interventions within payment models that support disparities reduction in a financially feasible way.[19] The program's call for proposals was created by the RWJF and its national program office at the University of Chicago, with the advice of a panel of technical experts and leaders in health care payment and delivery system reform and disparities.

The goal of the call for proposals was "to develop evidence that payment and delivery system reform designs that attempt to manage extrinsic and intrinsic incentives for overall quality and efficiency, while also explicitly attempting to reduce health care disparities, can produce positive results for each goal."[19] Note the distinction between improving care for all patients and reducing health care disparities among certain groups of patients. While some aspects of interventions might improve care for patients in general, the call for proposals asked applicants to propose payment and delivery system interventions that also contained components to reduce disparities.

The program also aimed to learn more about the optimal mix of intrinsic and extrinsic motivators that facilitate direct action by organizations and providers to eliminate disparities. Intrinsic motivation refers to a desire to reduce disparities as a personal value, as opposed to being motivated by an external reward. It is likely important to reinforce the intrinsic motivation of administrators and providers to reduce disparities ("It's the right thing to do") while increasing their self-efficacy ("I am confident I have the knowledge and skills to reduce disparities") and extrinsic motivators. The latter include financial, organizational, and reimbursement models that allocate sufficient resources both to give providers the flexibility to develop effective approaches to reducing disparities and to encourage them to do so.[19]

It is also important to avoid unintended negative impacts of economic incentives on intrinsic motivation. For example, providers might focus their attention only on clinical performance measures that are financially rewarded rather than the broad set of factors that affect patient outcomes. The program also envisioned that interventions would have strong links to the community and the social determinants of health. Those determinants—including education, income, and the physical environment—play a significant role in influencing a person's health, and addressing those determinants advances an equitable culture of health.[20]

The call for proposals, which incorporated these principles, was released in 2014,[19] and proposals were accepted and reviewed in the period March–August 2014. The program received forty brief proposals. Eight applicants were invited to complete full proposals, and three of them were awarded three-year grants beginning in October 2014.

DATA The data for our analysis came from the forty proposals submitted to this national program in 2014 (Appendix Exhibit A1).[21] We compared applications to the program against a checklist of proposal requirements. Proposals

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were required to identify a specific disparity in the grantee's patient population; a payment reform, defined as an alternative to fee-for-service payment; and a care delivery intervention. Applicants were also required to be in an active partnership that included at least one health care provider and one payer.

LIMITATIONS Our study had limitations. Our data came from a single national grants program, thus limiting generalizability. In addition, while the call for proposals of the Finding Answers program rewarded applicants that had a community linkage, broader interventions that addressed root causes of health disparities such as poverty, poor education, inadequate housing, and crime were beyond the scope of the program.[20]

Study Results

APPLICANT CHARACTERISTICS The applicants were distributed fairly evenly across US census regions (Appendix Exhibit A2),[21] and most projects were proposed in metropolitan areas (55.0 percent) or statewide (10.0 percent). The most common condition to be addressed in applications was diabetes (35.0 percent). The most common payer organizations were private insurers involved in Medicaid managed care (47.5 percent). The most common provider organizations were hospitals (40.0 percent) and outpatient practices (37.5 percent).

DISPARITIES Forty-five percent of the applicants targeted multiple disparities, but 10.0 percent of the applicants did not target a specific disparity between two groups (Appendix Exhibit A2).[21] Sixty-five percent of the applicants aimed to improve the care and outcomes of a racial or ethnic minority group without monitoring the same measure in one or more reference groups such as whites (that is, without measuring a disparity) (data not shown).

PAYMENT REFORM The most common payment model (used in 60.0 percent of the applications) was general pay-for-performance (Exhibit 1). Other frequently used models were modified fee-for-service (40.0 percent), global or capitated payment (32.5 percent), gain sharing or shared savings (25.0 percent), and episode-based bundled payment (20.0 percent). Ten percent of applicants suggested no payment reform model. Notably, 55.0 percent of the applicants proposed using two or more forms of payment reform, including combinations of pay-for-performance with global or capitated payment (25.0 percent), gain sharing or shared savings (15.0 percent), or episode-based bundled payment (10.0 percent) (Appendix Exhibit A3).[21]

The linkage of payment reform to disparities reduction was generally weak or indirect. None of the proposals linked payment directly to a demonstrated reduction in disparities between relatively advantaged and disadvantaged patient groups. Rather, proposals linked payment to absolute improvements in processes of care and health outcomes of the patient groups targeted by the intervention.

In general, applications gave few details about how payment changes might affect providers' intrinsic and extrinsic motivation. Several applications discussed combinations of both financial and nonfinancial incentives, such as feedback on performance or adding personnel such as a social worker, care manager, or community-based dental hygienist. Applicants proposed financial incentives for individual providers (17.5 percent); clinical teams (7.5 percent); entire practices, including both clinical and nonclinical staff (27.5 percent); ACOs or health plans (5.0 percent); and community health workers (7.5 percent) (Exhibit 1).

EXHIBIT 1

Types of payment reforms proposed to the Finding Answers: Solving Disparities through Payment and Delivery System Reform program

Type of reform	Description of reform	Proposals	
		Number (N = 40 applicants)	(%)[a]
Modified fee-for-service	Enhanced payment for physician services already reimbursed; physician reimbursement for services completed by member of the care team not previously reimbursed; or payment for a new service	16	40.0
Pay-for-performance	Bonus or incentive payments for performance in clinical process or outcome measures	24	60.0
Individual provider	—[b]	7	17.5
Clinical team	—[b]	3	7.5
Entire practice (clinical and nonclinical)	—[b]	11	27.5
ACO or health plan	—[b]	2	5.0
Community health worker	—[b]	3	7.5
Episode-based bundled payment	Set amount to manage a specific bundle of services, usually surrounding an acute event (such as pregnancy and hospitalization)	8	20.0
Capitated or global payment	Set amount to manage care for a given population over a specified time	13	32.5
Gain sharing or shared savings	Agreements whereby savings in the cost of care are shared between a payer and a health care organization	10	25.0
No payment reform	—[b]	4	10.0

SOURCE Authors' analysis. **NOTE** ACO is accountable care organization. [a]Twenty-two (55.0 percent) of the forty applicants to the Robert Wood Johnson Foundation's Finding Answers program proposed multiple reforms. Some pay-for-performance plans rewarded multiple entities. [b]Not applicable.

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CARE DELIVERY INTERVENTIONS Most (87.5 percent) of the applications proposed multifaceted approaches with multiple interventions (Appendix Exhibit A4).[21] The majority (62.5 percent) proposed educating either patients (40.0 percent) or providers (35.0 percent). More than half (62.5 percent) proposed to restructure the care team—for example, by adding a social worker or allied health professional. Other common interventions included engaging the community (40.0 percent), increasing access to testing and screening (40.0 percent), providing reminders and feedback to providers (37.5 percent), restructuring the care visit (25.0 percent), and expanding support services (17.5 percent). A few applications proposed patient financial incentives (12.5 percent).

FUNDED APPLICATIONS The three funded applications highlight some of the approaches found most compelling by the newer Finding Answers program's technical expert panel (Exhibit 2). Though none of the applicants met the full selection criteria in the call for proposals, the funded applicants' proposals were most closely aligned with the program's goals, and the grantees have further evolved to meet the program's aims with guidance from the Finding Answers national program office.

▶ **UNIVERSITY OF WASHINGTON AND ADVANTAGE DENTAL SERVICES, OREGON:** The University of Washington partnered with Advantage Dental Services, in Oregon, to target disparities in oral health outcomes via improvements in access to dental care (by changes to the care team and going outside of the traditional clinic to provide care) and the use of dental services by low-income children and pregnant women in seven rural counties in Oregon, compared with similar patient populations in seven comparison counties. Advantage, a large network of clinics and private dental offices throughout rural Oregon, serves as both payer and provider. This combined role may inherently increase organization-level motivation. Even before the partnership's application was funded, Advantage dentists were paid under a capitated arrangement or by salary.

Under the program, teams of staff members receive pay-for-performance incentives based on achieving predetermined targets for screening, the provision of prevention services, and treatment rates.

The care delivery intervention stratifies patients by risk and provides more care in the community than before the project. People are screened at schools, Head Start offices, and offices of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) to determine whether they need preventive or curative dental care. Dental hygienists with an expanded scope of practice and care managers work together to provide community-based preventive care such as sealants and low-complexity treatments and refer patients to dental offices for more complex care such as fillings. Regional liaisons work with team members to promote collaborative relationships among Advantage Dental Services, community-based organizations, and other key stakeholders.

▶ **GEORGE MASON UNIVERSITY, MOLINA HEALTHCARE, AND FAIRFAX COUNTY, VIRGINIA:** At the time of the application, the government of Fairfax County, Virginia, funded Molina Healthcare through a global budget to provide health services at three safety-net clinics for uninsured residents with low household incomes (that is, less than 200 percent of the federal poverty level). While the arrangement might not traditionally be thought of as "payment reform," given that the patients who are served are uninsured, the use of a capitated global budget represented a payment change that was generalizable outside of the project. Sixty-three percent of the patients were Hispanic. The other patients made up a diverse non-Hispanic population, collectively speaking more than fifty languages. The project targets the substantial disparities in chronic disease outcomes and care (for example, control of diabetes and hypertension and cervical cancer screening) that were observed between Hispanic and non-Hispanic low-income populations.

George Mason University helped Molina Healthcare tweak its existing bonus payment structure to implement a relative value unit (RVU)–based incentive system that reflects productivity and the processes of care that clinical leaders predict will have the biggest impact on the project's disparities reduction goals. Complex or time-consuming care in targeted clinical areas is weighted more heavily than other care in calculations that determine whether providers or care teams have attained the minimum threshold of hourly RVUs (for example, directly educating and counseling a patient has a higher RVU than simply referring the patient for education and counseling). Care team members receive performance incentives of up to 3 percent of their salary if their team meets RVU target goals.

It is anticipated that, with the use of principles of population management, teams will more rapidly identify and reach out to patients with the specified conditions, so that they are connected with care. This application had a truly team-based incentive, since population management requires effort from many members of both the clinical and administrative teams. Performance incentives go not only to providers but also to other clinical and nonclinical staff. This project has a moderate level of integration between payer (Fairfax County) and provider (Molina). The county is the only payer, and it both contracts with Molina to provide care and reimburses Molina for that care. George Mason University provides technical assistance and is the data evaluator.

▶ **ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI AND HEALTHFIRST, NEW YORK CITY:** The Departments of Population Health Science and Policy and Obstetrics-Gynecology at Mount Sinai Hospital partner with Healthfirst, a nonprofit, provider-sponsored health insurance company, to target disparities in postpartum care received by high-risk, low-income women covered by a Healthfirst Medicaid managed care plan, compared with low-risk women with commercial insurance. A care management intervention before discharge from the hospital after giving birth encourages postpartum follow-up and provides the patient with information about health conditions (such as hypertension, gestational diabetes, and depression), important health behaviors (for example, eating nutritious food and getting enough exercise), common physical and emotional postpartum symptoms, and self-management skills.

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EXHIBIT 2

Characteristics of funded applications to the Finding Answers: Solving Disparities through Payment and Delivery System Reform program, by key selection criteria

	Grantee		
Selection criteria	**George Mason University, Molina Healthcare, and Fairfax County, VA**	**Icahn School of Medicine at Mount Sinai and Healthfirst, New York City**	**University of Washington and Advantage Dental Services, OR**
Patient population, disparity focus, and key performance metrics	Adults; Hispanic vs. non-Hispanic; control of diabetes and hypertension, and cervical cancer screening.	Pregnant women; high-risk, low-income women with Medicaid managed care vs. low-risk women with commercial insurance; timely postpartum care.	Rural pregnant women and children; low-income people with Medicaid or CHIP vs. people with commercial insurance; improvements in access to and use of dental care.
Inclusion of a value-based payment reform that directly supports disparity reduction	Capitated system with a global budget that: funds incentives for monthly team-based RVU productivity and processes of care; uses incentive metrics aimed at overall health condition targets instead of reduction in disparities; provides midmonth metric reports to allow teams to make midmonth adjustments to meet incentive targets; and provides incentives of up to 3% of salary for team members.	Intervention costs are shared between payer and provider organizations, monthly enhanced payments are provided to obstetricians for timely postpartum care, and the incentive metrics are aimed at overall health condition targets instead of reduction in disparities.	Capitated system with a global budget that provides quarterly team-based pay-for-performance incentives for productivity and improving processes of care; some dentists are also shareholders in the company; incentives target overall improvement within counties instead of reduction in disparities.
Ability to maintain or increase intrinsic motivation	Monthly reports of metric scores for all teams for profiling; organizational culture values innovation and quality of care.	Education for clinicians on hypertension, gestational diabetes, and depression; provider-specific reports of metric scores shared with teams for profiling; organizational culture values innovation and quality of care.	Monthly incentive reports to teams; encouragement of staff to practice at top of skill level and provide high-quality care; organizational culture values innovation and quality of care.
Inclusion of delivery system change or quality improvement to reduce disparities	Culturally and linguistically tailored, team-based, population health and care management with clear roles for each team member.	Bedside patient education by a social worker, pre- and postdischarge care management by a care coordinator, or both.	Risk stratification of children and implementation of care management: simpler cases receive preventive care and treatment in the community by expanded teams of dental hygienists, care managers, and regional liaisons; more complex cases receive treatment by traditional office-based teams.
Generalizability and translatability of initiative	Suitable for organizations using capitation, global budgets, RVUs, and patient copayments, and for systems using team-based care.	Suitable where targeted patients are a fraction of provider's panel and payer's beneficiaries, where only physicians receive incentives, and for most perinatal care settings in diverse communities.	Suitable where the same organization serves as both payer and provider and for large systems, dental organizations that provide preventive care in partnership with community organizations, and payers with a market penetration that varies by region.

SOURCE Authors' analysis. **NOTES** Applicants were also evaluated on the diversity of their patient population, financial and programmatic sustainability, community involvement, cultural tailoring of health care delivery redesign, and conceptual model. For more details, see Robert Wood Johnson Foundation. 2014 call for proposals (Note 19 in text). CHIP is Children's Health Insurance Program. RVU is relative value unit.

With the help of a social worker and a care coordinator, the project enhances social support, connects patients to necessary medical care, and links them with community and Internet resources.

Financial incentives to Mount Sinai include enhanced payments for specific billing codes related to timely postpartum follow-up and a cost-sharing arrangement between Mount Sinai and Healthfirst to defray expenses related to employing the social worker and care coordinator. Nonfinancial incentives include education and performance feedback for clinicians, to bolster their intrinsic motivation.

Discussion

In 2013 the RWJF's Finding Answers: Solving Disparities through Payment and Delivery System Reform program began a focused effort to encourage innovation and identify practical lessons about using payment and delivery system reform to achieve health equity. An analysis of the forty applications to the

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program suggests that relatively few health care organizations and payers nationally are seeking grants related to this important subject. The bar for successful applicants to this program was high. In particular, payers had to agree to implement one or more payment reforms to help reduce health disparities. Other explanations for the few qualified applicants may be that few provider organizations have strong partnerships with payers, disparities reduction is not a priority for payers, the amount of grant funding was not sufficiently large to spur applications, groups do not know where to start in reforming payment to reduce disparities, and interested parties did not have sufficient time to apply.

In contrast, a call for proposals in 2006 for the RWJF Finding Answers: Disparities Research for Change program—which called for delivery system interventions to reduce disparities in cardiovascular disease, depression, and diabetes but did not require associated payment reforms—received 177 applications.[4]

Few applicants to the newer Finding Answers program submitted proposals that fit the intent of the call for proposals to design payment and delivery system reforms explicitly to reduce disparities, examine intrinsic and extrinsic motivators of providers and organizations, and engage the community. Remarkably, none of the applicants initially proposed a payment incentive to specifically reduce disparities. Instead, applicants tended to propose general pay-for-performance plans, hoping that these would improve the quality of care and outcomes of their study populations, or to propose global payment and shared savings plans, believing that these plans' indirect incentives would support the care management and preventive measures that could improve care and reduce disparities in health outcomes. The linkage of payment reform to disparities reduction was generally not strong. Most applicants aimed to improve the care and outcomes of a vulnerable population without specifically studying reduction in disparities, perhaps because most of their patients were from that vulnerable population. Thus, the Finding Answers national program office subsequently provided technical assistance to grantees about examining disparities explicitly and refining interventions to address the root causes of these disparities.

Most applicants did not address how they would try to optimize intrinsic and extrinsic motivation. Much of the existing evidence cautions that using external motivators (such as financial incentives) alone is unlikely to be the best way to reduce disparities, as only a limited number of processes of care and outcomes can be incentivized, and negative unintended consequences are possible.[22–24] In particular, concerns have been raised about how pay-for-performance could lead to gaming of financial incentives, distraction from important quality-of-care goals that are difficult to measure, a reduction in intrinsic motivation to reduce disparities, decreased provider and staff morale, and harm to social relations and teamwork.[25] It may be important to reinforce intrinsic motivation while implementing financial incentives, removing disincentives to achieving health equity, or both. Clearly, payment systems will need to be designed very carefully to maximize positive effects and prevent unintended negative consequences. It is probably necessary to tailor approaches to specific situations and people.[7,8,26]

Payment reform might also need to be viewed within the context of enabling ("can do") and motivating ("will do") factors. Enabling factors include having the resources necessary to reduce health disparities.[25] Motivating factors include the desire to reduce disparities. The types of payment reform that address enabling factors (for example, mechanisms to fund community health workers and intensive care management—services either not reimbursed or underreimbursed in traditional fee-for-service payment) might differ from the ones that address the motivation of individual providers. For example, early experience with safety-net ACOs suggests that systems need capital and financial flexibility up front to make the delivery system innovations necessary to improve care and reduce costs.[15] Moreover, it will be important to clarify which combinations of payment and care delivery reform are likely to be most effective and synergistic.

Mixed payment models (that is, models using more than one type of payment reform) might be particularly fruitful to explore, and it is promising that 55 percent of the applicants to the Finding Answers: Solving Disparities through Payment and Delivery System Reform program proposed multiple payment reforms. For example, consider how an ACO might reduce disparities with a combination of global payment, pay-for-performance, and specific equity accountability measures, which would assess whether or not disparities among groups were changing. Global payment might incentivize preventive care and care management to prevent hospitalizations, pay-for-performance might increase use of discrete preventive services such as mammography, and equity accountability measures could incentivize the achievement of equity.

Demonstration payment models might need to be sufficiently flexible to allow and encourage providers to determine and implement the best approaches to reduce disparities in their settings and populations.[7,15,16] The three proposals funded by the Finding Answers: Solving Disparities through Payment and Delivery System Reform program all combined pay-for-performance with interventions that can increase intrinsic motivation (for example, provider education and performance feedback) and global payment systems or funding streams that increase other resources (for example, capitated payment that funds the addition of dental hygienists, care managers, and social workers).

Conclusion

Given the rapid proliferation of new care delivery and payment reform systems, it is imperative to advance understanding of how these models might be designed and implemented to reduce health disparities. In addition, there is a need to create financial incentives to support the intrinsic motivation of organizations and payers to reduce disparities. Doing the right thing must be feasible. More demonstration programs that integrate care innovation and payment reform to achieve health equity are needed.[16] ■

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